WITH THE

AIX MASSAGE

AND

NATURAL VAPOUR TREATMENT

BY

HENRY W. FREEMAN

F.R.C.S

E. M. [illegible] 16 - Sept. [illegible]
Bath. 1888.

THE THERMAL BATHS OF BATH.

E. M. Sympson 16 - Sept. Bath
Bath. 1858.

THE THERMAL BATHS OF BATH.

THE

THERMAL BATHS OF BATH

THEIR HISTORY, LITERATURE,
MEDICAL AND SURGICAL USES AND EFFECTS

TOGETHER WITH

THE AIX MASSAGE

AND

NATURAL VAPOUR TREATMENT

BY

HENRY WILLIAM FREEMAN

Fellow of the Royal College of Surgeons in Ireland ; Member of the Royal College of Surgeons of England ; Licentiate of the Royal College of Physicians, London.

SURGEON TO THE ROYAL UNITED HOSPITAL, BATH.

LONDON : HAMILTON, ADAMS & CO., Paternoster Row.
BATH : CHARLES HALLETT.

1888.

TO THE MEMORY OF

RANDLE WILBRAHAM FALCONER, M.D.,

F.R.C.P., Lond.; D.C.L., Durham,

FOR MANY YEARS

SENIOR PHYSICIAN

TO THE ROYAL UNITED AND THE

ROYAL MINERAL WATER HOSPITALS, BATH.

THIS WORK IS DEDICATED

IN GRATEFUL RECOGNITION OF

SUBSTANTIAL HELP,

AND IN REMEMBRANCE OF

MANY ACTS OF KINDNESS RENDERED

TO THE AUTHOR DURING THE EARLIER

PERIOD OF HIS PROFESSIONAL CAREER.

Facsimile of Roman Frieze discovered in the Roman Bath.

"Knowledge will not be acquired without pains and application. It is troublesome and deep digging for pure waters; but when once you come to the spring, they rise up and meet you."

Felton.

PREFACE.

THE work now offered to the public is incorporated with the admirable little Manual, written by the late Randle Wilbraham Falconer, M.D., of which many editions were issued during the Author's lifetime. The essential features of that work consisted in the two chapters on The Mineral Springs of Bath and on The Medicinal Uses and Effects of the Waters; and, in order to preserve this portion, we have acquired the copyright of the book.

It appeared to us that, apart from the chapters referred to, the historic interest of the subject needed more ample treatment than has hitherto been bestowed upon it, whilst time and circumstances rendered it indispensable that a correct and careful account of the bathing establishment and appliances should be given, and brought down to the present time. Great advances and vast changes have been made by the Corporation during the past few years. Perhaps at no time during the last fifty years have the Baths of Bath been excelled in the comforts and luxurious arrangements made for bathers, by any Continental system in existence.

But this is not enough; the Continental systems have provided so much in addition to the Baths, which is regarded as essential, in many cases, to the full development of all the inherent virtues and efficacy of thermal waters; and to these Baths, in such cases, English patients and invalids have resorted, because no similar provision was made for them at the Baths of Bath. The recognition of this great fact and the determination of the municipality to compete in all respects with Continental rivals bids fair to add incalculably to the popularity and to the uses of the Bath Waters. It should be mentioned, however, that, in spite of all the nonsense we are accustomed to hear as to the decline of Bath and the use of the Bath Waters, the increased number of visitors to them during the past ten years has been enormous, as will be seen by the comparative table we give in footnote.[1] *This may be ascribed partly to the greater and more generally diffused knowledge of the Bath Waters and to the increased facilities for travelling, but it is mainly attributable to the judicious expansion of the bathing establishment, and to the more efficient management of later years. In this particular we at least are equal to the most favoured of Continental Spas. But we*

[1] NUMBER OF BATHERS AT THE HOT MINERAL BATHS.

In 1878	... ...	59,177	
,, 1879	... ...	56,560	
,, 1880	.. ...	54,139	
,, 1881	... ...	56,297	
,, 1882	... ...	61,303	
,, 1883	.. ...	59,733	(Queen's Bath Closed)
In 1884	... ...	72,725	
,, 1885	... ...	80,119	
,, 1886	... ...	83,223	
,, 1887	.. ...	85,081	
,, 1888	... ...	86,528	(Ending 25th March.)

aim at supremacy, and if the adoption of the appliances which have so far given Aix-les-Bains, Aix-la-Chapelle, Wildbad, and other Continental watering places an advantage, can assure to us that supremacy we shall, at any rate, try to achieve that object.[1]

The historic part of the work we trust may not be uninteresting to many who have no need of the waters; but obviously it is likely to be more attractive to those who seek in them, as it were, new life and renewed energies. We have given a short sketch of the Lives of a few of the most prominent Physicians of a former age; some of which are based upon Guidott's short "Lives." To these we have also added, for the information of the bibliographer and the collector, a list of each author's works, with here and there any special facts likely to be interesting. At the end of the preface, moreover, we have given, in alphabetical order, an approximately correct list of Books on the Bath Waters (omitting those above referred to), by those writers whose names are not included in the biographical notices.

The article on The Springs has been considerably amplified, fuller comparisons made with Continental and other Foreign Spas, both quantitatively and qualitatively, but the original spirit of the chapter has been for the most part adhered to.

1 We have ventured in this paragraph to put an interpretation upon what seems obviously the policy of the Council, a policy which meets with general approbation from all classes of the citizens.

A new chapter on the important subject of Massage has been added, and dealt with at considerable length; the European and American systems respectively detailed, forming a succinct but scientific explanation of what is known of Massage up to the present time.

A further chapter has likewise been added on The Therapeutics of Bathing, which brings the subject of Baths and Bathing up to the level of the physiological knowledge of to-day, and we hope this portion of the work may be carefully read and digested.

Bath in its Medical Aspects has been briefly dealt with, and some attempt made to show the comparative merits of the Bath Waters and the Continental Spas and the various systems which prevail.

A brief notice of Saratoga and its numerous Springs, and the Thermal Waters of Virginia, America, has been introduced.

We have dealt with the New and Varied Modes of Applying the Waters, the description of all the new methods of administration, including the Aix Massage Douche, the Berthollet, or Natural Vapour System (local and general), the Reclining Massage Bath, the Bouillon, the Needle Bath, etc., and the Salles de Pulverisation et Inhalation, and we hope in these leading features of the work the reader may find interest and edification.

The diseases in which the Waters are, or are not found efficacious, have been carefully described and classified. A more comprehensive pathological description of Gout and Rheumatism has been given, and the relative modes of treatment pointed out. A chapter has been added on the Surgical Diseases benefited by the use of the Waters.

The article on Climate has been used by permission of the writer, the Rev. Leonard Blomefield, published in the Proceedings of the Bath Natural History and Antiquarian Field Club in the years 1876 and 1887.

Our readers, we hope, will not consider that any apology is due from us for introducing a series of Illustrations which have more or less a relation to the subject matter of the work. Of these we here mention the facsimile of the "Oldest Map of the City," the "Plan of the Roman Baths," (1755), with Caldarium; and more especially the exquisitely beautiful plan of the same Baths, copied expressly for this work, from the original in the British Museum, by the late W. Hoare. This plan was taken immediately after the discoveries, and it differs in several very important points from later plans, which have been and are still used by antiquaries without question as to their accuracy. The Woodburytypes are executed by the Woodburytype Company, and we think they are worthy of commendation. The original plans were done on stone by the late Mr. Hollway, but the stones were destroyed before his

death, without any authority. All the plans, therefore, which are used in this work have been carefully revised and corrected by Mr. W. J. Willcox, architect. The Plan of the Caracalla Baths in Rome, which were contemporary with those of Bath, although constructed a little later, is given to show in what respect the Baths corresponded and differed from our own in form and construction. A description will be found in the Appendix.

With the view of simplifying reference to the various plans it has been deemed expedient to dispense with the numbers and the corresponding tables of reference, and to indicate each compartment, bath, &c., by printing the designation within its own lines.

Besides the various illustrations already referred to, we have introduced a small map, on a large scale, of The Precincts of the Baths, for the use of strangers. The baths are distinguished by being printed in a colour different from that of the body of the map.

The author cheerfully acknowledges the important services he has received from a friend during the progress of the work through the press. To Dr. Brabazon for kindly supplying the Mortality Statistics, and to Mr. Ekin for generously supplying the latest Chemical Analysis of the Mineral Waters, the author's thanks are due, and are hereby heartily rendered.

CONTENTS.

DIVISION I.

DIVISION II.

CHAPTER XIII.

CHAPTER XIV.

CHAPTER XV.

APPENDIX.

SUBJECTS.

ILLUSTRATIONS.

PLANS.

BIBLIOGRAPHY

OF THE

MINERAL WATERS OF BATH.

(With Literary Notes and Illustrations.)

[This Bibliography is only approximately complete, but it is sufficiently so to be useful to the collector, and interesting to many ordinary readers who are likely to peruse the pages of this work.]

Account for Establishing Bath Hospital, 12 Geo. II. 1739.
[Bishop Warburton published his sermon preached on the occasion.]

Barry, Sir Edward, Bart.—Observations—Historical, critical, and medical, on the Wines of the Ancients, and the analogy between them and Modern Wines. With General Observations on the Principles and Qualities of Water, and in particular on those of Bath. (Latin quotation from Cicero.) By Sir Edward Barry, Bart., Fellow of the Royal College of Physicians, and of the Royal Society. (Two engraved Medallions.) London, printed for T. Cadell, in the Strand. 1775. 4to. Allegorical Frontispiece, full page.

Bath General or Mineral Water Hospital (The).—From the *Bath Chronicle*, May 21, 1857. Bath, printed by H. E. Carrington, Kingston Buildings, 1857. 12mo.

Baylies, William.—Practical Reflections on the Uses and Abuses of Bath Waters, made from actual Experiments and Observations. London, printed for A. Miller, in the Strand. 1757. 8vo.

Baylies.—A Narrative of Facts demonstrating the actual existence and true cause of the Physical Confederacy in Bath, &c., by William Baylies, M.D. Bath, 1757. 4to.

[This relates to a bitter quarrel and controversy between Dr. Baylies on the one hand and Lucas and Oliver and Charlton on the other hand. The quarrel had its origin in matters connected with the General Water Hospital. Baylies appears to have been an unscrupulous man, who used a bitter tongue and wielded a still more bitter pen. In this "doctors' quarrel" it appears that Baylies alleged that Dr. Oliver had declared he would not consult with Lucas and Charlton in conjunction with him (Baylies). . . . Gough calls it an "impudent complaint." At any rate Oliver, a man of scrupulous veracity and gentle disposition, denied the allegation, and the result was the bitter quarrel (almost exceeding a clerical quarrel in its intensity) which forms the substance of this volume and the two volumes by Dr. Lucas. Public opinion appears to have been much against Baylies.]

Bayne, D.—A New Essay on the Nerves, &c., showing the great benefit, and true use of Bathing and Drinking the Bath Waters in all Nervous Disorders. London, 1738. 8vo.

Bowyer, Lodovick.—A treatise of warm Bath water in which is more than 200 cures made at Bath, in Somerset, by Bathing, Pumping and Drinking the water; with a Philosophical Account of the Elements, Subterranean Fires, and Fermentation of Metals, Minerals, &c. Taken from Boyle, Sir I. Newton, Johnus Baccius, Guidott, Boerhaave, Miller, Lister, Chancey, Oliver, Wynter, Willis, Floyer, Baynard, Quincey, Sydenham, Lodovick Bowyer, and many others. By same. 8vo. 1734.

(This is a rare book, containing a vast amount of information, which can only be obtained by consulting a large number of authors, and then only through much tribulation.)

Brabazon.—"Bath Mineral Waters; their Uses and Abuses. By A. B. Brabazon, M.D., Physician to the Bath Mineral Water Hospital." Bath: R. E. Peach, publisher, 8, Bridge Street. 1878. . . . . .

"In presenting these pages to my professional brethren, I am uninfluenced by any more ambitious motive than that of adding my humble quota of practical experience on this subject to that of others who have preceded me in the same field."—*Paragraph from the Preface.*

Chapman, Henry.—Thermæ Redivivæ. The City of Bath described; with some Observations on those Sovereign Waters, both as to Bathing in, and Drinking of, them; now so much in use. By Henry Chapman, Gent. London, printed for the Author, and are to be sold by Jonathan Edwin, at the Three Roses in Ludgate Street. 1673. 4to.

[This short treatise is dedicated "to the most August and Serene Prince Charles II., of Great Britain, France, and Ireland, King, &c." Mr. Chapman says in his preface that the work was intended to supply the want of "a plain, and cheap (not Scholastick) Divulgation to the World, of the present use of these Waters." This is the Henry Chapman who was the bitter and relentless opponent of Paynne. A restless, violent, unscrupulous partizan, but able, persistent, and, on the whole, popular. This is he who, on the accession of Charles II., in conjunction with Brydges, endeavoured to prevent the election of Prynne and another for the city. There was a great hubbub, some violence, no little illegality, and a vast deal of sickening professions of loyalty by those (not Prynne) who were always ready to make obeisance to the rising sun.]

Chapman.—Thermæ Redivivæ. The City of Bath described; with some Observations on those Sovereign Waters, both as to Bathing in, and Drinking of, them; now so much in use. By Henry Chapman, Gent. London, printed Anno, 1673; and re-printed MDCCXXIV. in Guidott. 8vo.

Charleton.—A Treatise on the Bath Waters; wherein are discovered the several principles of which they are composed; the cause of their heat; and the manner of their production. By Rice Charleton, of Bath, M B., F.R.S. Bath, 1754. 8vo.

Charleton.—Three Tracts on Bath Waters. By R. Charleton, M.D., Physician to the General Hospital. Tract the First: A Chymical Analysis of Bath Water. Second edition.—Tract the Second: An Inquiry into the Efficacy of Bath Water in Palsies. Second edition.—Tract the Third: History of Hospital Cases under the care of the late Dr. Oliver; with Additional Cases and Notes by the Editor. Bath, printed by R. Cruttwell; for W. Taylor, in Church Street, Kingston Buildings; and sold by R. Baldwin, No. 47, in Paternoster-row, London. 1774. 8vo.

Cheyne.—Observations concerning the Nature and Due Method of Treating the Gout, for the use of my worthy friend Richard Tennison, Esq.; together with an Account of the Nature and Qualities of Bath Waters. By George Cheyne, M.D. and F.R.S. London, 1720. 4to.

[The seventh edition 1725, was revised, corrected, and enlarged to more than double the former, entitled—

Cheyne.—An Essay of the True Nature and Due Method of Treating the Gout; together with an Account of the Nature and Quality of Bath Waters, the Manner of Using them, and the Diseases in which they are proper. London, 1725. 8vo.

[Referring to the duel between Mead and Woodward, Mr. J. C. Jeaffreson, in "A book about Doctors," says:—"The contest between Cheyne and Wynter was of a less bloody character. Cheyne was a Bath physician, of great practice and yet greater popularity—dying in 1734, at the age of seventy-two. At one time of his life he was so prodigiously fat that he weighed 32 stone; and he and a gentleman named Tantley being the two stoutest men in Somersetshire. One day, after dinner, the former asked the latter what he was thinking about. "I was thinking," answered Tantley, "how it will be possible to get either you or me into the grave after we die." Cheyne was nettled, and retorted, "Six or eight stout fellows will do the business for me, but you must be taken at twice." Cheyne was a sensible man, and had more than one rough passage of arms with Beau Nash, when the beau was dictator of the pump-room. Nash called the doctor in and asked him to prescribe for him. The next day, when the physician called and enquired if his prescription had been followed, the beau languidly replied, "No, i'faith, doctor, I haven't followed it. 'Pon honour, if I had I should have broken my neck, for I threw it out of my bed-room window." But Cheyne had wit enough to reward the inventor of the white hat for this piece of insolence. One day he and some of his learned friends were enjoying themselves over the bottle, laughing with a heartiness unseemly in philosophers, when, seeing the beau draw near, the doctor said, "Hush, we must be grave now, here's a fool coming our way." Cheyne became ashamed of his obesity, and earnestly set about overcoming it. He brought himself down by degrees to a moderate diet, and took

daily a large amount of exercise. The result was that he reduced himself to under eleven stone, and, instead of injuring his constitution, found himself in the enjoyment of better health. Impressed with the value of the discovery he had made, he wrote a book urging all people afflicted with chronic maladies to imitate him and try the effects of temperance. Doctors, notwithstanding their precepts in favour of moderation, neither are, or ever have been, averse to the pleasures of the table. Many of them warmly resented Cheyne's endeavours to bring good living into disrepute, possibly deeming that their interests were attacked not less than their habits. Dryden wrote :—

The first physicians by debauch were made,
Excess began, and sloth sustained the trade;
By chase our long-liv'd fathers earned their food,
Toil strung their nerves and purified their blood;
But we, their sons, a pamper'd race of men,
Are dwindled down to threescore years and ten.
Better to hunt in fields for health unbought,
Than fee the doctor for a nauseous draught;
The wise for cure on exercise depend,
God never made his work for man to mend.

Dr. Wynter arose to dispose of Cheyne in a summary fashion. Wynter had two good reasons for hating Cheyne: Wynter was an Englishman and loved wine, Cheyne was a Scotchman and loved milk.

DR. WYNTER TO DR. CHEYNE.

Tell me from whom, fat-headed Scot,
Thou didst thy system learn;
From Hippocrate thou hadst it not,
Nor Celsus, nor Pitcairn.

Suppose we own that milk is good,
And say the same of grass;
The one for babes is only food,
The other for an ass.

Doctor, one new prescription try
(A friend's advice forgive),
Eat grass, reduce thyself, and die,
Thy patients then may live.

Cheyne responded, with more wit and more good manners, in the following fashion :—

DR. CHEYNE TO DR. WYNTER.

My system, doctor, is my own,
No tutor I pretend;
My blunders hurt myself alone,
But yours your dearest friend.

Were you to milk and straw confin'd,
Thrice happy might you be;
Perhaps you might regain your mind,
And from your wit be free.

I can't your kind prescription try,
But heartily forgive;
'Tis natural you should wish me die,
That you yourself may live.

The concluding two lines of Cheyne's answer were doubtless little to the taste of his unsuccessful opponent."]

Chit-Chat; or the Pump Room at Bath in 1813. In verse. London, n.d. 8vo.

Corp, William, M.D.—An Essay on the Jaundice; in which the propriety of using the Bath waters in the disease, and in some particular affections of the liver, is considered. Second edition, with Additions, price 1s. 6d., advertised in *Bath Chronicle*, 29th January, 1789.

Falconer, W., M.D.—Essays on the Bath Waters, continuing an account of their possible impregnations, the best means to discover their contents, experiments, the effects of the waters on the human body, &c. 8vo. 1772.

Falconer, W.—"An Essay on the water commonly used in diet at Bath." 1776. 8vo.

Falconer, R. W., M.D.—"A Letter to the Mayor and Corporation of Bath on the present state and management of the Pump Rooms and Baths. Bath. 1854. 8vo.

Falconer, R. W.—"The Baths and Mineral Waters of Bath. By Randle Wilbraham Falconer, M.D., Physician to the Bath United and Bath General Hospitals, &c., &c. London: Simpkin, Marshall and Co. Bath: R. E. Peach." 1857. 12mo. With four plans of the baths, from drawings by Messrs. Manners and Gill.

[The introduction gives a concise history of the Baths, with a list of some authors of works on the waters.]

Falconer, R. W.—"The Bath General or Mineral Water Hospital." Bath: Hayward and Payne. 1860. 16mo.

Falconer, R. W.—"The Bath Mineral Waters in cases of Rheumatism, Sciatica, Gout, &c." Bath: Peach. 1861. 16mo.

[This work contains "reports of those cases only which have been under the writer's care, and were admitted into the Bath General, or Mineral Water Hospital, and discharged from it during the year commencing Nov. 1, 1859." The "Athenæum" said:—"It is free from the pretensions and quackery that too often disgrace the literature of mineral waters."]

Falconer, R. W.—An Account of the Bath General or Mineral Water Hospital. "PUBLICA MORBORUM REQUIES, COMMUNE MENDENTUM AUXILIUM, PRÆSENS NUMEN, INEMTA SALUS." Claud. Eidyl, 49, v. 69.

Second Issue.—Bath; Printed for the President and Governors of the Bath General Hospital by R. E. Peach, Bridge Street. 1869.

Falconer, R. W.—"The Hot Springs of Bath and their Medicinal Uses."

Gibbes.—A Treatise on the Bath Waters, by George Smith Gibbes, M.D., late Fellow of Mag. Coll., Oxf.; Fellow Roy. Soc.; one of the Physicians to the Bath City Dispensary. Bath: Meyler, 1800. 8vo.

[The substance of this treatise appeared previously in the "Philosophical Journal."]

Granville.—"The Invalid's and Visitor's Hand-book to the Hot Springs of Bath. By A. B. Granville, M.D., F.R.S., &c." London: Tilt and Bogue. Bath: Simms. 1841. 12mo.

[The following quotation will show the kind of writing in which the author seems to delight. "As we approached the city nearer and nearer coming from the south, a sight burst suddenly upon me the effect of which seemed as if produced by one of those magic presentations of a night scene introduced into French ballets, where in the midst of darkness, hundreds of enchanted palaces appear one placed higher than another, until the highest seemed to touch the dark azure vault, and with their glittering casement lights, mock the dazzling stars of heaven."]

Hillary, William.—An Inquiry into the Contents and Medicinal Virtues of Lincomb Spaw Water, near Bath. By William Hillary, M.D. London, 1742. 8vo.

[Note.—With an engraving of chemical glass vessels. Dedicated to Philip, Earl of Chesterfield. Another Edition in 1747.]

History of Bath, containing Interesting Information respecting the Roman Origin of the City, the History of its Abbey, Baths, Hospitals, Public Rooms, Park, &c. Frome: W. J. Harvey, n.d., 8vo.

Hot Bath.—The description of the Hot Bath, at Bath, rebuilt at the expense of the Chamber of this city; together with the plans, elevations, and sections of the same; the designs of John Wood, architects, *(sic)*, 1777, 4to.

Johnson, Dr. Thomas.—Thermæ Bathonicæ, sive earum descriptio, vires, utendi tempus, modus, &c,, Scripta a Thoma Johnsono. Scribere jussit Amor. Londoni, 1634.

[Note.—This is printed at the end of his "Mercurius Botanicus. . . . Hinc assessit de Thermis Bathonicis tractatus." A map of Bath is inserted, and there are curious woodcut views of the Baths]

A Second Edition in 1674.—(Lowndes.) Reprinted in 1849—only a few copies.

Jorden, Edward.—A Discourse of Naturall Bathes, and Mineral Waters, etc. London, 1631. 4to.

[Note.—Lowndes says, "A learned and elaborate work."]

Ditto, Second Edition.—A Discourse of Naturall Bathes, etc., etc. The Second Edition in many points enlarged. By Edward Jorden, Dr. in Physick. London: Printed by Thomas Harper, 1632. 4to.

[Note.—An edition dated 1688 is advertised in a bookseller's catalogue.]

Ditto, Third Edition.—A Discourse of Natural Bathes, and Mineral Waters, wherein the Original of Fountains in general is declared. The nature and difference of Minerals, with examples of particular Bathes. The generation of Minerals in the earth, from whence both the actual heat of Bathes, and their virtues proceed. By what means Mineral Waters are to be discover'd. And lastly, of the Nature and Uses of Baths, but especially of our Bathes, at Bathe, in Somersetshire. By Edward Jorden, Doctor in Physic. The Third Edition, Revised and Enlarged; with some particulars of the Author's Life. 8vo. Lond., 1669.

[See also Memoir, p. 98.]

Ken, Bishop.—Prayers for the Use of all Persons who come to the Baths for Cure. By Bp. Ken. London, 1712. 8vo.

(This was reprinted by the late J. H. Markland, D.C.L.)

Kerr, J. G. Douglas, M.B., C.M.—A Popular Guide to the Use of the Bath Waters. The *Bath Herald* Office, North Gate, 1884.

King, Louis, M.R.C.S.—Popular Sketch of the Bath Mineral Waters and their Uses. Second Edition. S. W. Simms, Bath. 1884.

Kinnear.—A new Essay on the Nerves, and the doctrines of the Animal Spirits, rationally considered; showing the great benefit and true use of Bathing and Drinking the Waters of Bath, in all Nerve Diseases and Obstructions. By a Fellow of the Royal College of Physicians of Edinburgh. London, 1733.

Lee, Edwin.—The Baths and Watering-places of England, considered with reference to their curative efficacy. With observations on mineral waters, &c. By Edwin Lee, Corresponding and Honorary Member, etc. . . . Second Edition, considerably enlarged. "Mineral waters may answer other purposes, but certainly their great and chief use is the preservation and health of man." Sturm's Reflections. London: W. J. Adams, 59, Fleet Street; Folthorp, Brighton. 1848. 8vo.

[With view of Bath, from Beacon-hill. At the end of book are critiques on first edition.]

Linden, D. W.—A reasonable and modest reply to Dr. Lucas's cursory remarks on Dr. Sutherland's treatise on Bath and Bristol waters. In which the innocence of brimstone is vindicated; and Dr. Sutherland's experiments on the existency of that mineral in Bath waters are confirmed. By Diederick Wessel Linden, M.D. London, 1765. 8vo.

[In the Gentleman's Magazine, May, 1762, page 198, was published a letter from Dr. W. Linden, to Dr. Sutherland, containing a rare phenomenon of the Bath Waters.]

Lucas, Charles, M.D.—Essay on Waters, including the city and thermal waters of Bath. 3 parts in two vols. 8vo.

Lucas.—An Assay on Waters. In three parts. Treating, 1. Of Simple Waters. 2. Of Cold medicated Waters. 3. Of Natural Baths. By C. Lucas, M.D. [Gr. and Lat. quotations.] Lond., 1756. 8vo.

[At p. 267 of Part III. is another title page, "Of the City and Thermal Waters of Bath. Addressed to the Right Honorable the Earl of Chesterfield." This description runs on to p. 347. There is a plate showing the remains discovered under the Abbey-house, in 1755. This is now one of the most difficult works to procure on the Waters, especially as it gives so much valuable information on the Roman discoveries of 1755.]

Lucas.—An Analysis of Dr. Rutty's Methodical Synopsis of Mineral Waters. Addressed, by way of Appeal, to the Royal College of Physicians of London. By C. Lucas, M.D. London, 1757. 8vo.

Lucas.—The Analyser Analysed. To which is added, An Appendix, as a Specimen of Decency, Candour and Humanity, published in the year 1757, entitled, "An Analysis of Dr. Rutty's M.S. of M. W. By Charles Lucas, M.D. [Lat. quot.] Dublin, 1758. 8vo.

Lucas—Letters of Doctor Lucas and Doctor Oliver. Occasioned by a Physical Confederacy discovered in Bath. [Quot. from Pope.] London, 1757. 8vo.

Lucas.—Cursory remarks on the method of investigating the principles and properties of Bath and Bristol waters; set forth in attempts to revive antient medical doctrines; and in an attempt to ascertain and extend the virtues of these waters. Both by Alexander Sutherland. London, 1764. 8vo.

Lucas.—The Theory and Uses of Baths, being an Extract from the Essay on Waters. By the late Charles Lucas, Esq., M.D. With marginal notes, by Dr. Achmet. Illustrated by some annexed cases. Dublin, 1772. 8vo.

[The Book refers rather to Dublin Baths.]

Lyell, Charles.—"Address by Sir Charles Lyell, Bart., LLD., D.C.L., F.R.S., &c.," at the Meeting of the British Association at Bath, 1864.

Macpherson, John.—Our Baths and Wells. London, 1871.

Mansford, J. G., M.R.C.S.—The Invalid's Companion to Bath; containing an Account of its Topography, Climate, and Waters; with copious Treatises on the diseases for which they are chiefly used. Bath.

Narrative of the Efficacy of the Bath Waters, in various kinds of Paralytic Disorders admitted into the Bath Hospital, from the end of 1775, to the end of 1785; with particular relations of fifty-two of their cases. Published by order of the committee at the Hospital Expense. Bath: Printed by R. Cruttwell, and sold by C. Dilly, Poultry, London; and by the booksellers in Bath. MDCCLXXXVII. 8vo.

Oliver, W., M.D.—A Practical Dissertation on Bath Waters, treating of the Antiquity of Bathing, of the original of Springs, of the causes of heat of the Bath Waters, and of their ingredients, of drinking Bath Waters, of Bathing, of the City of Bath, its situation, Baths, &c. London: Printed by J. D(arby), and sold by H. Hammond, bookseller in Bath. 1707. Reprinted 1716. 12mo. 4th edition contains "A relation of an extraordinary Sleepy Person, at Timsbury, near Bath."

[This physician was somewhat eccentric in his habits, but a philanthropist and an able physician.]

Oliver, W.—A Practical Essay on the Use and Abuse of warm bathing in Gouty Cases, by William Oliver, M.D., F.R.S. Bath, 1753. 8vo. The third edition is advertised at end of Chandler's Poem, 1767.

[This Dr. Oliver is the man referred to in the note on Baylies. He was the illegitimate son of the earlier Dr. Oliver, to whom he was in most respects superior. An ardent and enlightened philanthropist, he did much to promote the Water Hospital, to which he was the first appointed physician. He invented the famous "Oliver Biscuits," which, as a lady once observed to us, "would alone justify his existence;" but it was not all, for his tender nature and untiring zeal in the exercise of his professional calling have stamped his memory with lasting honour.]

Phillips, Sir Richard.—A Guide to all the Watering and Sea-bathing Places; with a description of the Lakes; a Sketch of a Tour in Wales; and Itineraries. London, 1806. 12mo.

[Note.—Contains a plan of the city and map of the country between Bath and Bristol, a view of the city from the Wells Road, and views of the Pump Room and North Parade, and 52 pp. of letterpress. Sir Richard died at Brighton in his 73rd year. He was born in London, and educated at Soho Square, and at Chiswick. His original name was Philip Richards. In 1786 he became an assistant in a school at Chester, and then afterwards went to Leicester and opened a school. In about a year he left his school and became a hosier. In 1790, he established "The Leicester Herald," a democratic paper. He was prosecuted for selling Paine's "Rights of Man," and sentenced to twelve months' imprisonment. After his release he parted with his paper, and returned to his hosiery business, till a fire consumed his house and stock. Being well insured he removed to St. Paul's Churchyard, London, where he opened a shop as a hosier. He then married Miss Griffiths. On the 1st July, 1799, he established "The Monthly Magazine," with Dr. John Aiken as editor, assisted by a talented phalanx of Dissenters in Church and State. This successful literary publication was followed by numerous other important works, most of which are enumerated in "Gent. Mag." for 1840. In 1807 he was elected Sheriff of London. His activity in that office was exemplary and beneficial, and he was knighted on the 30th March, 1808. At this time he published a memoir of his own career. Shortly afterwards, whilst his business seemed wonderfully on the increase, his commercial concerns became embarrassed, and his large establishment in New Bridge-street was broken up. Sir Richard recovered the "Monthly Magazine" and some of his beneficial copyrights, which he continued to manage with success. A list of his own writings may be seen, with fuller particulars of his life, in the "Gent. Mag." for August, 1840, pp. 212-214. (His work on the Baths is more curious than valuable. An anecdote was told of Sir Richard to the editor of this book by a literary friend, which is worth repeating. Before leaving Leicester he wrote a short treatise for a local work. Unfortunately the type got into "pie," but not having time to correct it he allowed it to be printed as it stood, with the title "A Chinese Puzzle." After some years he returned to Leicester for a brief period, and was encountered by an old friend, who sternly demanded a translation of "the Chinese Puzzle," which he had for twenty years vainly tried to make out, and was so angry when he ascertained the truth that he never spoke to his old friend again.)]

Pictorial World (The).—An Illustrated Weekly Newspaper. 1874.

[A page of 12 views of Bath and a full-page engraving, "The Royal Pump Room, Bath; Drinking the Waters." These are accompanied by a couple of columns of letter-press written by J. Tom Burgess.]

Peirce, Robert.—(See Biography; also page 129.) In the Philosophical Transactions, No. 169, there is a paper, "An Account of the Efficacy for curing Palsies and Barrenness. By Dr. R. P(eirce).

Pindar.—The Bath Pump Room; or, a Sovereign Remedy for low spirits. A poem by Peter Pindar. London, 1818. 8vo.

Pleasures of the Bath (The), with the First and Second Part of the Tippling Philosophers. Bristol, 1721.

Pugh, Robert.—Bathoniensium et Aquisgranensium Thermarum Comparatio, variis adjunctis illustrata R.P. epistolæ ad Illustrissimum Virum Rogerum Castlemaini Comitem. London, 1676. 12mo. [See page 138.]

Quinton, John.—A Treatise on Warm Bath Water; and of cures lately made at Bath, in Somersetshire. Oxford, 1733-4. 4to. 2 vols. Title of 2 vol. (1734) reads:—A Treatise of Warm Bath Water, in which is more than 200 cures made at Bath, in Somersetshire, by bathing, pumping, and drinking the waters, &c."

Randolph, George, M.D.—An Enquiry into the medicinal virtues of the Bath water, and the indications of cure, which it answers. London, 1752. 8vo.

Rutty, John, M.D.—A Methodical Synopsis of mineral waters, comprehending the most celebrated waters, both cold and hot, of Great Britain, Ireland, France, Germany, and Italy, and several other parts of the world. London, 1757. 4to.

Rutty.—A Free and Candid Examination of a Pamphlet; intituled, An Analysis of Dr. Rutty's Methodical Synopsis of Mineral Waters. [Quot. from Hippocrates.] London, 1758. 8vo.

Smollett, Tobias.—An Essay on the External use of Water, in a letter to Dr. ——, with particular remarks upon the present method of using the Mineral Waters of Bath, in Somersetshire, and a plan for rendering them more safe, agreeable, and efficacious. London (1752)-1767. 4to.

[Smollett made two visits to Bath, of which a full description will be found in "Bath: Old and New," by R. E. Peach. 1887.]

Spender, John Kent, M.D.—The Bath Thermal Waters; Historical, Social, and Medical, etc. With an Appendix on the Climate of Bath, by the Rev. L. Blomefield, M.A., F.L.S., F.G.S. "Spargit Aquis aditus: et aquæ medicamen habebant. Ovid. London; Bath (printed by W. Lewis), 1877. 8vo.

Spry, Joseph Hume.—A practical Treatise on the Bath Waters, tending to illustrate their beneficial effects in Chronic Diseases, particularly in Gout, Rheumatism, Paralysis, Lead Colic, Indigestion, Biliary Affections, and Uterine and Cutaneous Diseases; confirmed by cases. Containing, likewise, a brief account of the City of Bath, and of the Hot Springs. By Joseph Hume Spry, Surgeon, &c. [Latin quot.] London: Longman, Hurst, Rees, Orme and Brown, Paternoster-row. 1822. 8vo. With plan of the Roman Baths. Printed by R. Cruttwell, Bath.

The Description of the Hot Bath at Bath; republished at the expense of the Chamber of the City; together with the plans, elevations and situation of the same. 1777. 4to.

(Dr. Spry was for many years the lessee of the Kingston Baths.)

Tunstall, James.—The Bath Waters: their Uses and Effects in the Cure and Relief of various Chronic Diseases. By James Tunstall, M.D., etc. London: John Churchill, Princes-street, Soho. MDCCCL. 8vo. Printed by J. and J. Keene, Bath.

[With a statistical table, showing the proportion of cases per cent. cured and relieved by the Bath waters. Chapter xiv. enumerates the advantages presented by Bath as a permanent residence.]

Vicary, Thomas.—The English Man's Treasure, with the True Anatomie of Man's Bodie, also the rare Treatise of the English Bathes. [Bathe, Bristowe, Wells, &c.] By William Turner, Doctor of Physicke. Gathered and set forth for the benefite and cure of the poorer sort of People. 1613. Sm. 4to. Black Letter.

Warm Water; or popular expositions of the learned motto on the Grand Pump-room in the city of Bath. Ἄριστον μὲν ὕδωρ, *etc.*—Bath, 1797. 8vo.

Wilson, Andrew.—Bath Waters, a conjectural idea of their Nature and Qualities, in three Letters, To ——; to which is added, Putridity and Infection, unjustly imputed to Fevers, a cruel Public Grievance, attempted to be redressed, with some account of the Nature and Management of plain Fevers. By A. W., M.D., Reg. College, Med. Edinb. Soc. Bath: Printed and sold by S. Hazard, sold also by G. G. and J. Robinson, Murray and Strahan, London. 1738.

Qy.—Another Edition. Bath, 1788. 8vo.

Wynter.—Of Bathing in the Hot-baths at Bathe; chiefly with regard to the Palsie, and some Diseases in Women, &c. By John Wynter, M.B., Coll. Christi. Cantab. London, 1728. 8vo. Two plates by V. Gucht.

Wynter.—Cyclus Metasyncriticus; or, an Essay on Chronical Diseases; the methods of cure; and herein, more fully, of the medicinal waters of Bath and Bristol, their several virtues and differences. By John Wynter, M.B., e Coll. Christi. Cantab. London, 1725. 8vo.

Wynter.—The Hot Baths at Bath, chiefly with regard to the Palsie and some Diseases in Women. In a letter added to Dr. Freind. By John Wynter. 1728. In this there are two views of the head of Apollo, and an inscription erected by the author to the memory of Dr. Guidott.

INTRODUCTORY DIVISION.

THE literary annals of the Thermal Waters of Bath have yet to be written as a distinct work. Only a partial attempt will be made in this book to supply such want, because it is not our primary object to deal with the literary so much as with the practical element, as involved in the medical application of the Waters under new and wholly changed conditions. At the same time it is proposed to amplify the introductory portion of the late Dr. Falconer's book, by the addition of some historic and literary facts of interest which, so far, seem to have escaped the notice of previous writers.

No statement deserving of credit has been preserved regarding the discovery of the Hot Mineral Waters of Bath. The account given by *Jones*, in his *Bathes of Bathes Ayde*, which attributes their creation to "Bladudus Magus, that wyse Magicyan;" and also *Wood's* statement in his *Description of Bath*, which declares their detection to have been effected by Bladud and his swine;—are examples of those legendary histories, by which even modern writers have attempted to supply the want of authentic records. If any truth exists in such legends, it is generally extremely difficult to disentangle it from what is fictitious or fabulous.

Every city and town, and nearly every village, has its own tradition or traditions, fables, and super-

natural stories connected with it. But it is especially noticeable that wherever thermal springs exist the fabulous and superstitious element prevails to a much larger extent. It is moreover to be observed that when, as in the case of Bath, they are of prehistoric antiquity, these traditions have from age to age acquired fresh incrustations of fable and superstitious legend. It is so in Bath. We can with comparative certainty trace the origin of the Bladud legend, which is told in one short paragraph in the old British History of Geoffrey of Monmouth.

"Next succeeded Bladud, his son, and reigned twenty years. He built Kaerbadus, now Bath, and made hot baths in it for the benefit of the public, which he dedicated to the goddess Minerva, in whose temple he kept fires that never went out nor consumed to ashes, but as soon as they began to decay were turned into balls of stone. About this time the prophet Elias prayed that it might not rain upon the earth; and it did not rain for three years and six months. This prince was a very ingenious man, and taught necromancy in his kingdom, nor did he leave off pursuing his magical operations, till he attempted to fly to the upper region of the air with wings which he had prepared, and fell down upon the temple of Apollo in the city of Trinovantum, where he was dashed to pieces.

"After this unhappy fate of Bladud, Leir, his son, was advanced to the throne, and nobly governed his country sixty years."

This legend has as much substratum of truth as the story of Jack the Giant Killer, but we prize it and should be sorry to lose an inheritance which has been cherished and believed for many ages. Dr. Giles, by whom the Chronicle of Geoffrey of Mon-

mouth was translated, gives the table showing the long line of illustrious British Kings, which he traces up to Adam himself. Whether Geoffrey believed the stories he tells with "every time and circumstance" or not we cannot say, but Dr. Giles (as well as other translators) seemed to think he did. Be this as it may, the learned antiquary adds a contemptuous note of warning to his readers of the absurdity of the royal pedigree.[1]

Now, the ordinary vulgar version of Bladud is to be found in all the Guides, and for a hundred and ninety years it has had curreney in connection with the swine, so that it is needless to repeat it here. What is so curious is the difficulty of ascertaining when and how this swinish story became first associated with the history of so august a prince as Bladud. The earliest mention which we can find of the porcine family and the important part they played in Bladudian times, is in Peirce's Memoirs published in 1697. Peirce was not an imaginative person, nor was he given to romance, although he was credulous even to superstition, but this does not explain the historical problem of the pigs. He says, it is true, he got the whole story from "an old manuscript Chronicle that I have by me, though it hath much larger stories of other

1 The translator directs the reader's attention to the anachronisms in the table. For instance, between the reigns of Brutus and Leil, is an interval of 156 years; and yet Geoffrey makes the capture of the Ark contemporaneous with the reign of Brutus, and the building of Solomon's temple with that of Leil. Now the interval between these two events cannot by any possibility be extended beyond eighty years. It is, moreover, impossible to bring the chronology of the British kings themselves into harmony with the dates before Christ, as there is no mention made of the exact interval between the taking of Troy and Brutus's landing in Britain.

Geoffrey inscribes his work to Robert, Earl of Gloucester, son of Henry the Second.—(I. 1.)"

Kings before and after him, even from *Brute* himself." This is obviously the Chronicle of Geoffrey of Monmouth, to which reference has been made. It may be that in the MS. copy from which Peirce quoted, the pig story has been interpolated, there being nothing of the kind in the original. In former times MS. copies of the legendary histories were often made, and ingenious copyists were at times not over scrupulous.

Peirce adds, "How true the story above may be I know not, but I am sure there is nothing impossible in it, nor very improbable, and every jot as likely as that Charles the Great should find the Baths at Aix-la-Chapelle by the tread of his horse, when he was riding a hunting, as Mons. Blondell relates. And it may be the pigs had a share also in discovering the neighbouring Baths at Borcett, the same author saying that they are called *Thermæ Porcetanæ*, from the wild pigs frequently coming down from the neighbouring mountains, perhaps to warm themselves, as ours did into the Alder-Moore. But whatever be thought of this or that, I do know that for more than forty years that I have lived here there hath not one past wherein there hath not been more than few instances of very great Cures done upon leprous, scabby, and scurfy persons, and more perhaps might have been (at least sooner) done, if they had *bathed* as he did, in mud and water together. But the nicety of our age is satisfied with nothing but fresh Baths; whereas in many cases (and this particularly) the mud is as effectual (if not more so) than the purest of the water."

Absurd and incredible as the legend is, from the time of Peirce and until the beginning of the century, it was generally believed. Wood, the architect, took up the story after Peirce, amplified it with

extravagant nonsense, laid down with dogmatic confidence the most preposterous theories, in which his contemporaries implicitly trusted. The pigs would have dropped out of the legend altogether if Wood had not given them fresh vitality. It is not to be regretted, for what originally was regarded with superstitious credulity has proved to be a source of harmless amusement and romance.[1] It seems difficult to believe that as late as 1704 the citizens of Bath on the occasion of a public ceremonial could be seen in procession chanting the praises of the puissant King Bladud![2] All this has its amusing, and in a sense, its useful side. It shows us so much that was characteristic of ages past, and to some extent it proves that the manner in which these legends were chronicled, was primarily instrumental in the rudest and most unruly periods of our history in preserving the springs from desolation and destruction. But there was another element which prevailed apart from the legends and traditions, and that was the superstition with which the people regarded the springs themselves. We suspect the Corporation practised a "pious fraud" upon them, either to ensure some kind of regularity, or to keep alive a mysterious interest in the Waters for gain or imaginary advantage of some kind. This fact will be apparent from the perusal of Holinshed, whose Chronicle, written by "Parson Harrison," is given after the version of Mr. Furnivall, in a later chapter.

Some writers think that the ancient British city was of considerable extent. Stukeley says "the

1 It is surprising to find so many well-informed writers stating that Turner and Jones and other early writers on the Baths of Bath make mention of the pigs and their wonderful cure. Both Mr. Emanuel Green and ourselves have examined nearly every authority previous to Peirce without finding such a reference.

2 See *Pump Room*

magnitude of Bath in its ancient state could not have been less, in respect to the land of its whole area, than that of Babylon, when Cyrus took it." However this may be it seems clear that the British city, whether large or small, lay around the springs, and that the Britons were neither ignorant of, or indifferent to, their healing virtues. This is proved by the terminology which has been preserved through successive ages, which was used in relation to the Baths :—

"*Caer Ennaint*, importing the City of Ointment. They likewise called it *Caer yr naint twymin :* that is, the city in the warm vale. They also gave it the names of *Caer Palludur*, and *Caer Badon* ; the former implying the City of Pallas' Water, the latter the City of Bath."

Pre-Roman Period. "At the southernmost extremity of the Cotswold Hills, overlooking the valley of the Avon, there is an almost isolated eminence, which is the most commanding, though not the highest of its group, and which from its shape is calculated to draw the attention of the spectator. From most points of the compass it appears as a truncated cone, with a flat top of about half the diameter of its base.

* * * * *

But if this eminence is peculiar in its shape, it is no less remarkable by position. The explorer who, attracted by its uncommon aspect, has reached its level top, is thence enabled to command a view of the valley of the Avon through a greater extent of its course than from any other point would be possible. For almost at his feet the river, which comes flowing towards him from the south through

the long and lovely valley of Warleigh, makes a bend abruptly to the westward, and draws his eye to the nest-like hollow where the City of Bath reposes. It is the peculiar advantage of this position that it affords him an extensive view of the valley of the river both upwards and downwards, such as he could command from no other point. Besides this home-view there is also an expansive general prospect, reaching to Alfred's Tower at Stourhead, which is situated at the opposite extreme of the county. Nor are these all the peculiarities of this peculiarly shapen and peculiarly stationed eminence. It has a peculiar name. Placed in the midst of names of a common every day type, it has itself a name that a man must travel far to match, if indeed he can match it anywhere. It is called Solisbury or Solsbury. This is a name that recalls romantic places, like Salisbury Plain and Salisbury Crags, but whether it has any affinity with these, must depend on what these shall be decided to mean. I shall endeavour to ascertain the meaning of our 'Solisbury' alone. In the Itinerary of Antoninus we find Bath under the name of *Aquæ Solis*, i.e., *The Waters of the Sun*, and we might have been content to see in this a mere Roman designation totally excluding the knowledge of any previous name, and superseding any native associations which had belonged to this locality before the Romans came. Happily, however, the diligence of learned Antiquaries has found a way for us through the Roman barrier. It seems clear from the inscribed stones that have been from time to time dug out in various parts of Bath, that under this name *Solis* we have something more interesting to us than the genitive case of Sol, the sun. It is found spelt *Sul* in the connection *deæ Sul-Minervæ*, which shows that it was the name of a divinity, and that this Sul

was identified in attributions with the Romans' Minerva.

We take the fact as established, that Solis—however understood or misunderstood by the Romans—represents *Sul*, a local and native sacred name, which these waters owned before ever a Roman bathed in them.

And with this we return to the consideration of Solisbury or Solsbury. The termination "bury" signifies a fort or stronghold, and it is to the English language what *Arx* was to the Latin.

It seems then that Solsbury is Arx Solis or Sulis, and that this name sets up a claim as of some special relationship having subsisted between this hill and this city of Aquæ Solis or Sulis. This conclusion, which speech-lore alone might justify, looks very secure when surrounded by its evidence—viz., of Inscriptions, Itinerary, local configuration and position.

To what then does this lead? It leads us to catch a glimpse of an answer to the question with which this chapter opens. It suggests that in the days when this country was occupied by an indefinite number of petty nations, and when these were so commonly in a state of war with each other that the open country was exposed to frequent raids, a position of natural strength exercised on the population just the same kind of attraction that a castle did in times nearer to our own. How many a modern town owes its existence to a mediæval Baron, who chose the then solitary spot to pitch his castle on. So in more remote ages, when an isolated hill was the best refuge, these hills became in like manner the parents of cities. Such is the history of Old Sarum and Salisbury—such is the history of Edin-

burgh, which is grouped about its "Maiden Castle" —of Dorchester, whose "Maiden Castle" is as far from the town as Solsbury from ancient Bath—of Durham, if one may be guided by appearance, analogy, and name—of Corinth, with its Acrocorinthos, and Syracuse with its Acradina.

But the most striking topographical parallel which can perhaps anywhere be found to illustrate this probable relation between Solsbury and Bath, is afforded by Florence and its (reputed) parent-fortress, Fæsulæ. Three miles N.N.E. of Florence rises the ancient *Arx*, which now goes by the village name of Fiesole, but which was once the fortified town of *Fæsulæ*. It occupied the summit of the hill, an advanced post or buttress of the Apennines, overlooking the Val d'Arno, as Solsbury overlooks the Valley of the Avon.

No one can turn a practised eye on Solsbury without once perceiving that, moderate as it is in elevation, it possesses almost all the qualities desirable in a popular hill fortress. The level top of 30 acres area, spacious enough to accommodate a considerable population, would be available in a moment of alarm for all the neighbouring people, with their flocks and herds and moveables. Here they could encamp and let the danger pass. It is precipitous enough for defence, and yet not so steep as to be inaccessible for horned cattle. Above all, its sides are well supplied with water, that requisite without which the most inviting positions are untenable.

In estimating the importance of an ancient site, the Archæologist will always glance at the adjacent roads. Not at the modern highways of communication and traffic, but at those sequestered by-ways

where, if anywhere, the fairies frolic still. These are mostly of high antiquity, and they often point silently to spots once frequented and celebrated, now deserted and silent. The old road at Bathford, the ferry at Bathampton and the roads leading to it, may possibly contain a tacit allusion to the ancient greatness of Solsbury. We venture a surmise that if the system of Pre-Roman Roads in this part could be recovered, it would be found that this hill was the centre towards which they converged. In short, we shrink not from the responsibility of opining that Solsbury was something more than a hill-fort occupied merely on an emergency; that it is the venerable site of a well-inhabited and populous British city.

But not to urge this opinion on the reader, we would assert no more than this, that in Solsbury we seem to find the first favourable condition for the congregation of a population in this valley. That Solsbury was once a city and that Bath was colonised therefrom is a supposition that may be accepted or rejected; but that it was the *Arx* or "burg" of the Avon valley, and of the city of Sul, is hardly likely to be disputed. It matters little whether it actually gave a population to the city beneath it, or only fostered the growth of the city by its facilities for retreat; in either case Solsbury must occupy the first chapter in a History of Bath.[1]"

The foregoing is not incompatible with the theory that a British settlement once occupied the site of the present city of Bath, and that through the obscurity which envelopes its history, the outlines of an extensive city are traceable, which was dis-

1 Rev. John Earle, Professor of Anglo Saxon, Oxford, in "Bath Ancient and Modern."

tinguished above all those of the West; and hence, it is inferred as probable that its inhabitants did not neglect the mineral waters of the locality.

It is, however, more likely that the British, for the most part, occupied the elevated positions in the neighbourhood, where remains of their habitations are yet traceable; and that the hot waters of the valley formed a morass, the overflowings of which were poured into the river Avon; still, it must be conceded that if they did inhabit the valley, all indications of their dwellings would be eradicated by subsequent occupants.

CHAPTER II.

Dull days were those, till our good Arthur broke
The Pagan yet once more on Badon Hill.[1]

* * * * * *

And at Caerleon had he help'd his lord,
When the strong neighings of the wild white horse
Set every gilded parapet shuddering;
And up in Agned Cathregonion too,
And down the waste sand-shores of Trath Treroit,
Where many a heathen fell; 'and on the Mount
Of Badon I myself beheld the King
Charge at the head of all his Table Round,
And all his legious crying Christ and him
And break them;
* * * * * *'

Elaine.

THE period at which the history of Bath and the Bath Waters can be truly said to commence, is with the Roman occupation of the locality of the present city, which, according to *Warner*, was A.D. 54, or subsequent to A.D. 50 in the opinion of *Whitaker*, and lasted until A.D. 410. No two authorities agree either as to the time of the Romans coming or departing. Some affirm that the former

1 See Chapter III.

was A.D. 40, others 50, 54 and even later; whilst as to the latter Whitaker says A.D. 410, Bede 427, and others later. The presence of the Romans is indicated by many remarkable remains of their workmanship, which have been found and preserved, and among these are the ruins of buildings of magnitude and great beauty, erected in various parts of the neighbourhood, as well as in the immediate vicinity of the springs, portions of which contribute to form one of the richest and most interesting collections of Roman Antiquities in England,[1] among which attention may be specially directed to the remains of a temple found beneath the site of the present Pump-Room.[2] These, however, are but the remains of a still larger collection which was in existence more than two centuries ago, and elaborately described by Guidott.

One of the most important discoveries of a Roman building, connected with the use of the hot waters, was the finding in 1755 of the ruins of a Bath, of considerable size, in the position at present occupied by Kingston Buildings and Baths, near the Abbey. These remains have been described by many eminent writers. Some idea of the size of the building in which the baths were contained may be formed from the statement that "they occupied an area, 240 ft. from east to west, and 120 ft. at the broadest part from north to south, that they were highly decorated with tesselated pavements, columns, pilasters, and every ornament of classical architecture." These baths, it is probable, were destroyed

1 These remains, the property of the Corporation of Bath, are placed under the care of the members of the Bath Royal Literary and Scientific Institution.

2 For an account of the ruins of the temple *Vide* Scharf Archæolog: xxxv. p. 190, and Scarth Aq. Sol., p. 19, et. seq.

by the Saxons,[1] who succeeded the Romans in their occupation of Bath, and their ruins must subsequently have escaped notice, inasmuch as eight feet below the surface, but still considerably above them, several stone coffins, containing remains of persons of both sexes, and coins from the mints of several Saxon kings,[2] were simultaneously discovered. Additional remains of these Baths were discovered in 1799 and in 1803.

There is very little new that can be said of these earlier discoveries of 1755. The later excavations and discoveries, which in an especial sense may be regarded as the development of the earlier, have revived, or it may be said have given new life and interest to those of 1755. What the archæologist and the antiquary lament is that nothing was preserved of the Baths themselves except the memory, and we are under unspeakable obligations to a few rare and enterprising spirits for even that, enshrined as it is in their clear and vigorous descriptions. It might have been thought that the magnitude of the loss they describe and deplore would have quickened the sense of the generation of to-day to the importance of preserving every vestige of Roman work

1 With deference we dissent from the original author on the point. We believe the destruction occurred between the departure of the Romans and the Saxon Conquest, sometimes referred to as "the period of desolation," when the Britons were making gallant efforts against the Picts and Scots by whom everything was laid waste, until they were driven away by the "invincible Arthur." Nor do we believe when Bath was taken by the Saxons there was much to destroy. They found a scene of desolation, and began the work of reconstruction, as it was clearly their interest to do. The depth at which the bodies were found was many feet above the level of the Roman baths, and at the ordinary depth at which the Saxons buried their dead.

2 There was a Mint at Bath. *Vide* "On Coins issued from Somersetshire Mints," by the Rev. T. F. Dymock—Somersetshire Arch. and Nat. His. Soc.; Proceed. for 1849-50, p. 12.

and every indication of Roman genius, discovered in our own time, if it were only as a distinct evidence of the antiquity and the vast interest which belong to a city which, even in early apostolic times, was animated with the energetic life and the luxurious habits and civilization of Rome itself. It is pleaded that if all has not been preserved in a manner to ensure universal approbation, it is owing to the exigencies consequent upon the demands upon the space around the baths. Be this as it may, we cannot enter into the controversy further than saying that, if we do not agree with the reasons assigned, we are hopeful that less permanent injury may have been done than some allege.

It is generally admitted that the description given by Dr. Spry in 1822 of the discoveries of 1755 is full and clear. He has carefully collected what earlier writers have recorded, and we have the further advantage of his own acute and clear elucidations. But it must be observed that some of his statements have been proved to be erroneous, and his theories shown to be unsound by the result of recent developments.

"The finest specimens of baths in this country, after the model of the Roman baths, are those discovered in this city, which were undoubtedly built under the inspection of the Romans; and it is to be regretted that on the discovery of these beautiful remnants of antiquity the whole of the baths had not been excavated, and their foundations fairly traced. We might then have had the advantage of using the identical Roman baths so highly praised by Solinus; or even if the springs had been lost, or their site too low for present use, their preservation might have been secured by a walled fence, and they

would have remained the delight of the antiquary, and an everlasting monument of the original grandeur of this elegant city.

"The excavations of Herculaneum and Pompeii are considered as national works, and the honour of the country interested in their progress. Here we have a specimen of grandeur and magnificence which would do honour to Herculaneum, or even Rome herself, accidentally discovered in the highest state of preservation; and yet with a Vandalism wholly unaccountable, they are buried amidst a chaos of filth to form the foundations of beggarly houses, that never can repay their elevation.

"These baths, it is known, were discovered under the Priory, in the year 1755, and were then seen by Dr. Lucas, who conjectured that what was then visible was merely one wing of a magnificent building, and that further examination, if it were possible, would *probably* show a corresponding wing on the western side, beyond the great bath. On some further examination taking place in 1799 and 1803, these ideas were found to be correct, and part of corresponding foundations were discovered, similar to the eastern wing. The lithographic etching shews the part of the baths discovered at various times, and their connexion will very easily be perceived.[1]"

He also adds Dr. Lucas's account:—

"'Under the foundation of the Abbey House, full ten feet deep, appear traces of a bath, whose dimen-

1 The etching to which Spry has referred is here reproduced, and with it the representation of an ancient *Caldarium*. But it must be explained that the description does not fit the facts. The late discoveries do not show a "corresponding wing," but they show the great bath, which will shortly be fully developed. (See *Appendix I* for description of the *Caldarium*.)

sions are 43 feet by 34. Within, and adjoining to the walls, are the remains of twelve pilasters, each measuring three feet six inches on the front of the plinth, by a projection of two feet three inches. These pillars seem to have supported a roof. This bath stood north and south.

" 'To the northward of this room, parted only by a slender wall, with an opening of about ten inches in the middle, adjoining a semicircular bath, measuring from east to west 14 feet 4 inches, and from the crown of the semicircle to the partition wall which divides it from the square bath, 18 feet 10 inches. The roof of this seems to have been sustained by four pilasters, one at each angle, and two at the springing of the circle. This bath seems to have undergone some alteration, the base of the semicircle is filled up to about the height of five feet, upon which two pilasters were set on either side from the area, between two separate flights of steps, into the semicircular part, which seems to be all that was reserved for a bath. In this was placed a stone chair, eighteen inches high and sixteen broad. The two flights of steps were of different dimensions: those to the west were three feet nine inches broad, those to the east four feet two inches. Each flight consists of steps six inches thick, and seems to have been worn by use three inches and a half out of the square. These flights are divided by a stone partition, on a level with the floor. Along this division, and along the west side of the area, a rude channel, of about three inches in depth, was cut in the stone. The floor of this bath seems to be on a level with that of the square bath.

" 'Eastward from the area and stairs of the semicircular bath, stood an elegant room on each side, sustained by four pilasters.

"'Separated by a wall stood the *Hypocausta Laconica*, or *stoves*, to the eastward. These consisted of two large rooms, each measuring 39 feet by 22; each had a double floor, one of which lay one foot nine inches lower than the area round the square bath. On this lower floor stand rows of pillars, composed of square bricks, of about an inch and three-quarters thick, and nine inches square. These pillars sustain a second floor, composed of tiles two feet square, and two inches thick, over which are laid two layers of firm cement mortar, each about two inches thick, which compose the upper floor.

"'To the northward, separated by a wall of three feet eleven inches, stood the other *Hypocaustum*, with a door of communication. The floor of this is about eighteen inches higher than the other.

"'These two rooms are set round with square brick *tubes* of different lengths, from sixteen to twenty inches in length, and six and three quarters wide. These flues have two lateral openings, of about two inches square, five inches asunder. These open into the vacuum between these two floors, and rise through the walls. The north wall of the last stove was filled with tubes of a lesser size, placed horizontally and perpendicularly. The stones and bricks between the pillars bear evident marks of fire, while the flues are strongly charged with soot, which plainly point out their uses.

"'Heat was communicated to these flues by means of *præfurnia*. In the middle of the northern wall of the second stove, the ruins of one of these furnaces appear. It consists of strong walls of about sixteen feet square, with an opening in the centre of about three feet wide, which terminates conically in the north wall of the stove, two feet

In this old map there are only a few objects marked by the author; these are indicated in the upper left hand corner. For the information of the reader, the editor has identified. with approximate accuracy, other objects which are marked in figures, and are printed in blue.

1. Church of St. Michael, (without the
2. Broad Street gate.)
3. Walcot Church
4. The North Gate
5. West Gate
6. Timber Green (Sawclose)
7. Spurrier's Lane
8. Vicarage Lane
9. Lock's or Cocks Lane
10. Westgate Street
11. Cheap Street
12. Stall's Church
13. Stall Street
13a. St. James's Church
14. The South Gate
15. Orange Grove (now called)
16. The East Gate.
17. St Mary's Church by Northgate
18. St. Mary's Rampire
19. Horse Street
20. St. Lawrences Bridge
21. ,, ,, Chapel
22. Bath Arms

It is the
two years
, it will at
of objects
rd.
re will be
epicted in
n maps,
observed,
ns of the

wide, where part of the broken arch bears evident marks of fire. About the mouth of the furnace there were scattered pieces of burnt wood, charcoal, &c., evident proofs of their use.

"'On each side of the furnace, adjoining to the wall of the northermost stove, is a semicircular chamber, of about ten feet four inches by nine feet six. These floors are nearly two feet six inches lower than that of the next stove, into which they both open. The pavements are tesselated with variegated rows of pebbles and red bricks.

"'To the northward of these appear ruins of two other square chambers, of more ordinary work.'"

"In Dr. Jones's map of the city of Bath there is a tennis court adjoining the bath, 81 feet by 27, with a private door to open into the bath for the accommodation of the players. This appears to be an imitation of the Roman gymnasia; for to the Roman thermæ was united every institution which could afford exercise to the body, or relaxation to the mind.[1]

"Thus we have given a statement of these noble baths, as described by Dr. Lucas, and have only to repeat our regret that the baths were not pursued to their full extent. There are many reasons for wish-

1 It is necessary to say here that Spry has fallen into the error from which so many others have not escaped—in referring to what he calls *Jones's Map* (of which we speak more fully elsewhere). There is no such map. The map contemporary with Jones is given with this work, and contains no such thing as a tennis court. Although the tennis court depicted on Johnson's map, which was published sixty years after Jones's time, was undoubtedly in connection with the Baths, it is absurd to suppose that any thought of the Roman gymnasia led to its erection. The truth is the game was generally popular, and had become universal, with about as much thought of the Roman gymnasia as of the gladiatorial encounters of Pompeii.

ing such had been the case, for on a review of the baths it will be perceived, that, besides the private baths and sudatories, in the *one wing alone there is a public bath, 41 feet by 34;* in the western wing similar accommodations, and *another public bath, 41 feet by 34*; and in the centre, *the grand public bath, 90 feet by 68.* Let us pause a little, examine the dimensions of these baths, and then enquire where is the spring which is to renew them daily, as undoubtedly was the case at the period of their erection? That the spring exists at this moment in the centre of the grand public bath, I have no more doubt than I have of the existence of the baths themselves; and if the excavations had been properly pursued, there would it have been found. All our springs together are not sufficient for the supply of baths of such magnitude. Would the Romans, who studied convenience as well as elegance in all their buildings, have erected baths at a distance from the springs? Certainly not. *They built upon the springs,* that they might flow, with as little diminution of heat as possible, to supply the grand bath first, then the smaller public baths, and the private baths. Look at the situation of the King's Bath, compare it with the centre of the Roman Bath; I do not believe they have the slightest communication. The King's is a spring of itself, as is demonstrated by its great heat; if it filtered through the earth from the Roman bath, and was a part of that spring, it certainly would be diminished in temperature, and occasionally in quality.'"

It will be seen that although common sense seemed to support much of Spry's theory, in many respects it has been upset by recent discoveries. The great bath of 1755 must have been supplied by

the spring used long after the Romans by the Bishops and Monks after the Norman conquest (to which reference is made elsewhere). The learned doctor is quite right in stating that "the King's is a spring of itself," although he could have known nothing of the construction of the bath, its Roman origin, and the Roman well, as brought to light by recent excavations. But he was wrong in his confident hypothesis that the spring existed "in the centre of the grand public bath," reasonable and rational as the theory was. The opening up of that "grand public bath" has shown that it was supplied by the spring of the King's Bath. Nor was he correct as to the dimensions, the size being 111ft. 4in. in length and 68ft. 6in. in width, but it was too much to expect that there would not be considerable deviations between the bath of which the full details could not be known by those who first saw it, and what it proves to be now it is fully developed, with all the characteristics of its construction and formation clearly seen, and its surrounding architectural features. The "imaginary plan"[1] which, proving to be inaccurate, by no means detracts from the value of the researches of those men by whose courage, intelligence, and literary skill, so much has been

1 Mr. Davis quotes, as he is fully justified in doing, the words from an able letter, signed "Fairplay," to the effect "that the existence of the great Roman Bath having been transferred from the region of conjecture to the region of fact we owe to the enthusiasm and unwearied zeal of Major Davis, and no fair mind can deny him the credit of being the practical discoverer of the great Roman Bath. More credit than this he has never claimed." If the last clause were omitted no one could object to the statement. On page 9 of his book the City Architect uses far more unqualified language, or at any rate, what seems so. But the more skilful pen of Fairplay recognises the fact that there was a bath, seen and known, though imperfectly, by Lucas and Sutherland, and not unlikely by Hoare, which proves to be different from what they conjectured.

preserved to us, and without whom the discoveries of 1755[1] would have been a "lost chapter" in our local history.

Besides Spry's plan (we call it so though it might with equal truth be called Lucas's) we give a facsimile of William Hoare's plan, together with a copy of his letter accompanying it. These, we believe, have not been published before. We regret that we cannot with certainty say who the nobleman was to whom they were sent, there being no superscription upon either plan or letter; we believe, however, it was either Lord Chatham or Lord Chesterfield, both of whom were friends and patrons of Hoare.

Bath, July 29, 1762.

My Lord,

With This I have sent your Lordship a copy of my Plan and View of the Roman Baths in the state they appeared when first discovered, to which is added part of the South side of the Abbey to show their situation.

In the Perspective View your Lordship will see in a room adorned with Corinthian Pillasters an Oblong Bath, with its Area and Descent by Steps, and contiguous to it a smaller semicircular Bath, with a descent of six very high steps as appears by the Plan, but extremely wore by the Foot. In the shaded part at A is the spring and channel of the water.

The other large Room has two Sudatories belonging to it, with tessellated Pavements which are exactly drawn on the Plan. In the middle between these is the Fireplace and Flue for heating the Room. The Floor is suspended on Pillars of square Brick, as in the Drawing, beneath the Plan at B.

C shows the manner of the Sudatorys with their tubulated Bricks, which were continued up and along all the Walls of the Room.

1 We think it right here to protest against an error over and over again repeated in the City Architect's pamphlet in reference to these discoveries. He writes of them as being in 1754, then in 1754-5. There is not the remotest evidence to be found anywhere that any kind of discovery at this time was earlier than 1755.

Near one of the Sudatories the Floor is broke up to show its construction.

On the Brick Pillars, which are Nine Inches square and Four Feet high, lies a Flagstone Cap one inch and a half high, and sixteen inches square, over which are placed Bricks two feet square and two inches thick, and the whole is covered with Terras.

I am, with Great Respect,
Your Lordship's most obliged
humble Servant,
WILLIAM HOARE.

My daughter desires to join with me her most dutiful Respects to your Lordship and the Ladies.

The capitals, spelling, and punctuation are literally followed.

The history of the discoveries of 1871, as they may be called, has yet to be written. When party feeling and passion have subsided, then, it may be hoped, a Warner, a Pownall, or a Scarth, will do full justice to a subject which, up to the present time, has excited so much angry controversy, without any adequate record and description of the most important antiquities of their kind of the present century.[1] A city official has published a summary of the discoveries in a popular form, suited for the guidance of ordinary investigators so far as it embodies his own share in the work. The time, perhaps, has not arrived when the work can be adequately treated in all its historical and antiquarian importance. A profound investigation, made in connection with previous enquiries, may present to us some practical results tending to modify former conclusions both as regards facts and theories.

The spirit in which the task must be undertaken is embodied in the following extract from Prebendary

1 See description of Baths—King's Baths.

Scarth's preface to *Roman Britain*:—"These three[1] are the great sources from which the compiler of a popular history must draw his matter; but there is much to be gleaned from the papers published by the different archæological societies, and to go carefully through these must be the work of years, unless the writer has been from the first acquainted with their proceedings. * * * He regards archæology as the handmaid of history, and as giving a life and colour to it, which can never be attained from a simple study of written history. The examination of Roman remains, the inspection of Roman coins, the study of Roman buildings, give a reality to history which no amount of reading and scholarship can supply. Scholarship and archæology should go hand-in-hand, and should be made subservient to the highest purposes. It has been well observed that the power of looking into, and of understanding, a ruin, may be regarded as one of man's highest attributes; and this can only be attained by placing in the hands of all a work which shall combine true history with sound archæology."

THE ROMAN CITY.

The city of Bath abounds with an interest all its own; its annals, both ancient and modern, are unique. It has no rival amongst English cities, either for beauty, situation, its local literature, or the antiquity of its past history, lost, as it were, in "primeval obscurity." Bath has a series of histories —a succession of epochs, each distinctive in itself, and all differing from each other, whilst all have left their impressions upon the historic traditions and names of the city, as we have seen.

1 "Britannia Romana," "Monumenta Historica Britannica," and "Corpus Inscriptionum Latinum."

The pre-historic and British period,[1] as we have seen, affords ample scope for the antiquary's speculations and ingenious theories, whilst the mythical, like that of Rome, in the theory of its origin, attempts to account for the discovery of its thermal springs by the story of Bladud, which is as "real and proper a myth as the wolf-nurse legend of Romulus and Remus."[2]

There was nothing mythical about the Roman period. It is a vast reality, full of interest for all time. The contemplation of the fragments of architecture with all its sculptured symbolism, coins, inscriptions, pottery, Samian ware, and that noble series of baths, of which we have been treating, bring us almost face to face with the Roman city of Bath and its founders, with all its ancient splendour. The chief edifices were grouped near to the principal source of attraction—the great luxury of the Romans—the hot springs. We cannot tell what the superstructure was like, but it must have been very vast and imposing. We can judge from the scale of the baths what the conceptions of the Romans must have been with regard to proportion, order, and arrangement of their public edifices. On the site of the Abbey stood the Basilika, the Temple of Diana occupied the site coincident with that of the present Pump Room, and opposite to that stood the great

1 When the Belgæ conquered the British, and then amalgamated with them, they occupied, as we have been led to suppose, the "Ancient British City," whatever that might have been, and it is more than probable the Baths were first discovered and utilized by them. When the Romans took possession of the Baths they drove out the Belgæ, and the Britons, who once more took refuge on the heights, and no doubt occasionally looked down with amazement upon the city which rapidly grew under Roman enterprise.

2 Boccacio, in the fifteenth century, made Bladud the subject of his satire, in some lines translated by Lydgate, given later.

Temple of Minerva, the presiding deity of the springs, on whose altar, as in the Temple of Vesta, at Rome, a fire was kept perpetually burning. Fragments of these temples are preserved in the Royal Literary Institution. The Gorgon Shield of the Portico, and a fine bronze head of Minerva being conspicuous. The forum occupied a portion of the present Abbey-yard, and extended over a considerable area towards the North. The Temple of Minerva, it is said, survived the Saxon conquest, and a portion of it was at a later period converted into the Church of St. Mary de Stall, which was destroyed in the 17th century. About fifty years ago a small portion of the crypt was discovered in the cellar of a wine merchant whose house occupied a part of the site of the old church.

The Roman Camp is described by Polybius and must have been of vast extent. Besides volunteers and "allies" there were two legions of Roman soldiers. The present configuration of that part of Bath which was the site of the Roman city is in its cardinal features almost identical, and enables the intelligent observer to place himself almost in the position to enable him to take a survey of the city as it was in the time of the Romans. Whether Wood was right or not in every detail, whether Bath was or was not the *Camalodunum* (which we do not believe) of the Romans, signifies little or nothing; still it must have been the most magnificent city in Roman Britain. We place ourselves at the north-west corner of the Abbey, from whence in our "mind's eye" we perceive those two grand heathen temples at the termination of the churchyard, towering to the skies. To the west and south, now represented by Westgate Street and Stall Street, lay the main body of the Roman city, in which have

been found the cornices, capitals, and fluted columns, indicative of great architectural splendour. To the north we can imagine that noble street the *Principia*, one hundred feet in width, running through almost the centre of the camp, arranged with due regard to the grades and discipline characteristic of the Roman legions; whilst it would require no great stretch of the imagination to fancy that we were standing under the shadow of the Basilika itself. To the south, extending in a westerly direction, were grouped the Baths, which, except perhaps in Rome itself, were unrivalled in external splendour, not less than in the perfection of those internal details which at present are partly revealed to us. If the Romans left no evidences of their wisdom as conquerers and rulers, they left ample proof of their luxurious habits, their vast intelligence, grandeur and power.

When in 410, or about, the Imperial legions departed, the Britons and Belgic Britons assumed the Government of the West, the great transition from Heathendom to Christianity, little as we know of its precise operation, could not have been made without "antagonism and confusion."[1]

"BRITISH INTERVAL."

The period between the departure of the Romans from Bath and the Saxon conquest is one of almost impenetrable obscurity. When the date of the

1 It is supposed that the idol Sul-Minerva was now destroyed, and the temples dismantled. The Basilika became a Christian temple, and remained so until 775, when King Offa rebuilt the Church, which survived until John de Villula's time.

former can be determined the exact duration of this "interval" can also be ascertained. Taking the earliest period, A.D. 410, then there would be 167 years during which Bath would be exposed to civil strife, and the attacks of her surrounding as well as distant foes. Warner says, "the splendid ceremonies of heathen superstition, brought by its Roman founders from the continent, which had maintained their ground here with undiminished lustre until their departure from Britain; when new religious rites less elegant and more disgusting, poured into the temples of *Aquæ Solis*; and the fanes and altars of Minerva, Apollo, Jove, Hercules, and Diana, beheld themselves polluted and deformed by the monstrous mixture of Celtic worship with their own classical ceremonials; the whole forming a superstition so absurd and abominable as scarcely to be paralleled in the copious history of human folly and imbecility." If, we say, this be true, then a people so utterly besotted and barbarous would scarcely bestow much care upon those noble baths erected and adorned by the Romans.

These British were a mixed race of Belgæ, Briton and Romanized Briton, without any of the distinctive virtues of either. They were submissive to the dominant rulers, but greatly enfeebled by vice and pampered by indulgence into effeminacy. On the whole they were treated with humanity and kindness by the Romans, to whom they looked for protection. We know something of the Roman city, and we know a good deal of its government and institutions. But we can scarcely conjecture what the government of such a people as these British would be, even during the seventy of the one hundred and sixty-seven years before they were exposed to the attacks of the English. We scarcely catch that "distant

inarticulate reverberation of internal convulsion" so aptly worded by Mr. Earle. Indeed we are left altogether to conjecture, except as to the mere name of the city, *Akeman*. All we have to guide us in relation to the conduct of the city is experience, and experience teaches us the fate of all great and highly civilized cities when left to the mercies of rude and semi-barbarous people. The phrase applied to this "interval" as a "period of desolation" is on the whole, we think, only too true, and further we believe that it must have been during this period that, partly from neglect and partly from "internal convulsions," and partly from the unavoidable violence of war, that the great Roman city, and especially the Baths, suffered dilapidation, decay, and destruction.

"During the greater part of this gloomy, agitated and sanguinary period, Bath appears to have enjoyed a state of comparative repose. Situated at a considerable distance from the great scene of action, the southern and eastern coast of Britain, the sword of the invader did not for many years extend its devastations to the northern shores of Somersetshire, or disturb the quiet of the towns upon the Severn. Continual reinforcements from the continent, however, enabled the Saxons to gain successive advantages over the Britons and gradually to enlarge the limits of their acquisitions, till their forces penetrated into the interior of Somersetshire. This happened about the year of our Lord 493, when for the first time since their arrival the Saxon hordes threatened the town of Bath; and under the command of Ælla and his three sons, Cymenus, Pleting, and Cissa, encamped on Lansdown[1] and formally

1 We think this is erroneous. It was more likely to have been Bannerdown, for reasons given in a later note.

besieged the city. At this period the spirits of the Britons were somewhat revived by the extraordinary talents and invincible courage of Arthur, the most renowned of all our British worthies, who appears even through the clouds of fable which involve his achievements to have been a great and accomplished hero. Apprised of the operations of Ælla, the British leader hastened after him, and reaching his camp before he had been able to take the city he attacked and defeated him in one of the most terrible battles that had yet been fought between the Britons and their foes. But this was not the only obligation for which Bath stood indebted to the invincible Arthur,[1] since he saved it once more from the yoke

1 Arthur is called the "British leader," but whoever he was and whatever he was the forces he led were not ordinary Britons, but a purer Celtic race, the *Devonshire Welsh*. [Neither will it be impertinent if I annex hereunto what our countreyman, Joseph, a monke of Excester, no vulgar and trivial Poet, verified, sometime of Arthur in his Poeme Antiocbeis, wherein he described the warres of the Christians for recoverie of the Holy Land, and was there present with King Richard the First, speaking of Britaine:

For famous death, and happier birth, hence flourish'd next in place
Arthur the flower of noble kings; whose acts with lovely grace
Accepted and admired were, in peoples mouth and eare,
No lesse than if sweet honey they, or pleasant musicke were.
See former Princes, and compare his worth even with them all;
That King in Pella borne, whom we great Alexander call,
The trumpe of fame doth sound aloft. The Roman stores eke
Much praise and honour both, of their triumphant Cæsars speak,
And Hercules exalted is for taming monsters fell:
But Pine trees, hazels low (as sunne, the starres), doth farre excell,
Both Greeke and Latine annals read; no former age his Peere,
Nor future times his match can shew, for this is plaine and cleere,
In goodness he and greatnesse both, surmounts Kings all and some,
Better alone, than all before, greater than those to come.

And this worthy Knight (that I may care so much also by the way out of Ninnius the Britain, if it be worth the noting) was called Mabuter, that is, a terrible or dreadfull sonne, because he was from his childhood cruell; and Arthur, which in the British tongue imparteth as much as a horrible beare, or any iron walls wherewith the lion's jaws are bruised and broken.—*Camden, edition*, 1637.]

of Saxon bondage. This event occurred on *Mons Badonicus*[1] in the year of our Lord 520, when Colgrine, Cheldrike, and Bladulfe, commanders under the Saxon leader Cerdic, marched a powerful army into the vicinity of Bath, and again closely besieged it. But nothing could elude the vigilence and activity of Arthur; he was quickly with the enemy attacked them on the scene of his former victory and with similar success, killing two of the leaders and destroying with his own hand four hundred and forty Saxons. These defeats, which were attended with an incredible effusion of blood from the personal animosity of the contending parties, appear to have weakened the south Saxons considerably, and prevented them from renewing their operations against Bath for upwards of fifty years. But the period when it was to receive a foreign yoke at length arrived. In the year 577 the Saxon chieftains Ceaulin and Cuthwin (the former of whom was King of Wessex), led their armies towards the north-east of Somersetshire, and advanced to Dyrham, a village about eight miles from Bath. Here they found an enemy ready to receive them. The three Kings, Commail, Candidan and Farinmail, who had assembled their forces to protect the cities which were yet unsubdued in this part of Britain. But the Saxon auspices prevailed; the three monarch's fell in battle, and their royal residences, Gloucester, Cirencester, and Bath, were numbered amongst Ceaulin's conquests.— *Warner.*

---

1 The White House, Greenwich; October 11th, 1885.

Mr. Sharon Turner, in his valuable "History of the Anglo-Saxons," edition 1820, vol. i., pp. 263 and 269, has alluded to King Arthur's greatest and last battle, or siege, in his last conflict with the Saxon invaders, at the "Badonicus Mons," and, after citing several different opinions on the position of the Badon

Hill (advocating the claims of a hill in Berkshire, of Bath, of Bannestone, or Bathstone), gives his opinion (not very decidedly) in favor of Bath. I trust that I am not acting presumptuously in suggesting a new locality, which I think possesses claims superior to any of these which I have mentioned.

It is important to bear in mind that the station in question was not a mere hill encampment, but a fortress capable of resisting a siege. The struggle occurred in the lifetime of Gildas, the British Historian, who expressly uses the words "obsessionis Badonici montis."

By the side of the carriage road from Blandford Forum to Wimborne Minster (both in Dorsetshire) about five miles from Blandford, is a very fine double-ringed circular fortress, known through the country and described on the maps by the name of "The Badbury Rings."

The Latin name used by Gildas, "Mons Badonicus," is a literal translation of the Saxon name, "Bad-bury," and the double ramparts of Badbury were certainly competent to resist a vigorous siege.

At a distance of about two miles from Blandford, on the same road, is a smaller fortress called Buzbury. I have not personally visited this part, but it appears to be generally similar to Badbury.

In the opposite direction from Blandford, but in the same general line with Badbury, Buzbury, and Blandford, are "Hod Hill" and "Hamilton Hill," about four and six miles respectively from Blandford. Upon these hills are immense intrenchments; not, so far as I could observe, in the nature of a fortress, but rather, as I imagine, for field resistance to armies approaching from the south-west. It is evident that the whole country was in military excitement, and that a great position ten or twelve miles long had been taken up by the Britons for resisting an army which was approaching from the south-west—say from a landing in Weymouth Bay.

The consideration of these points fixes in my mind the conviction that a fortified line was thus established, of which Badbury was the south-eastern termination; that Badbury was the point most strongly pressed in siege; and that Badbury was the real Mons Badonicus of Gildas.

G. B. Airy.

[Sir G. B. Airy confounds Bannerdown with Batheaston, which are quite distinct. Camden is quite clear on this point. The distinction in ancient times was as clear as in the present day—Bannerdown and Batheaston.]

" Queen's College, Oxford;
October 19th, 1885.

Sir George Airy's suggestion that the Mons Badonicus, or rather Badonicus Mons, of Gildas, should be identified with Badbury, is not new.

It has already been made by Dr. Guest, as far back as 1849, in his paper on 'The Early English Settlements in South Britain.' The equivalent of the two names, however, seems to me very doubtful. At all events, it has not been noticed that 'Badonicus Mons' is not 'Mount Badon,' but the hill belonging to Badon, which is quite a different affair. Badon must be the name of either a river, a city, or a district, more probably of the last.

A. H. Sayce."

" St. Margaret's, West Dulwich;
October 17th, 1885.

Sir George Airy's account of the chain of forts of which Badbury Rings is one is interesting and, as far as I know, given in none of the histories; but he need not fear to be accused of presumption in suggesting Badbury as a new locality for the Mons Badonicus. This has long been the accepted site. For example, Freeman's 'Old English History' says, 'He won a battle over the English at Badbury in Dorsetshire in 520;' adding in a note, 'Mons Badonicus,' not Bath, as used to be thought.'

W. M. Acworth."

" Blackheath; October 17th, 1885.

May I supplement Sir George Airy's interesting remarks on this subject by the following? If we accept as genuine the description of Mons Badonicus ('qui propre Sabrium ostium habetur') which is given in the printed copies of Gildas in the passage referred to, it is evident that the site of the battle must have been in the county of Gloucester, or not far from it. Of course it is on account of these words that Bath was considered to have been the place. Carte, however, noticing how unsuitable the site of Bath was to that of the battle, suggested that the sentence stating that it was near the mouth of the Severn was merely the note of some unskilful transcriber, which crept into the text of a copy of Gildas.

He conjectured that it was 'Mount Badon or Badbury, a place of considerable strength in that age by reason of its elevated situation.' This place, Carte says, is in Berkshire on the borders of Hamp-shire, but I think he must mean Badbury Hill in Wiltshire, between Swindon and Marlborough. Sir George Airy points out the suitability, from strategic considerations, of the Badbury in Dorsetshire. The argument derived by him from the name of the place applies, of course, equally well to the other Badbury in Wiltshire. With regard to Bath, Carte contends that, besides

the unsuitability of the location, it was 'too well known, if besieged, to be called by any other name than Caer Badon.' But it is also very unlikely, from the course of the Saxon advance, that the place could have been so far to the west as Bath. This is an additional cause of suspicion as to the genuineness of the disputed sentence in Gildas.

Another point is, perhaps, worth mentioning. Gildas has been called 'Badonicus,' which is supposed to mean that he was a native of Bath. However that may be, I think the narrative implies that the battle was not fought at his birthplace; for he does not mention this, although he is careful to tell us that it took place in the year of his nativity. Had it been at the place, as well as in the year of his birth, he might well be described as, like one of Homer's heroes,

"To combat born and bred amidst arms."

W. T. Lynn."

Queen's College, Oxford;
October 26th, 1885.

Carte was, no doubt, right in regarding the statement that 'Badonicus Mons' was near the mouth of the Severn, as an interpolation in the text of Gildas, but I should question whether the interlopator had Bath in his mind. In the first place Bath can hardly be described as being 'near the mouth of the Severn,' and, secondly, the statement must be taken in connection with a notice in the Harleian MS. of the 'Annales Cambriæ,' under the year 665, 'Bellum Badonis secundo.' The Harleian MS. belongs to the eleventh century, and the compiler of the earlier annals can be shown to have written about 955. At this time, therefore, there was a large place known to him which he identified with the Badonicus Mons of Gildas. It can hardly have been outside Wales, or even on the Welsh frontier, since the Saxon Chronicle contains no allusions to wars carried on against the Welsh by the Saxons in 655, or, indeed, to any wars at all. It would consequently seem to have been a war waged by the Welsh princes themselves. There is, of course, another alternative, that of supposing a mistake in the Chronology of the Harleian MS. The war in question having been that carried on by Ceaulin, the King of Wessex, in 658, against the Welsh of Devonshire and Cornwall, who were defeated at Pen and driven beyond the Parret. In this case the Badon of the Welsh annalist would be the Pen of the Saxon chronicler.

A. H. Sayce."

[Carte was the Jacobite curate of Bath Abbey.]

The locality of *Mons Badonicus* is a moot question, and if the writers of some of these notes here appended as to its remoteness from Bath be correct, it deprives us of an interesting

historical episode in our annals. One thing is certain, and that is that *Mons Badonicus* could not have been Lansdown, for in Roman times it was from its Bath side a rugged inaccessible mountain, and continued to be so long after the Norman Conquest. Camden, still no mean authority, and who manifestly knew more of the locality than either of the writers here quoted, except Mr. Sayce, says:—"The English Saxons about the 44 yeare after their comming into Britaine, when they had broken league and covenant and kindled again the coales of war which had already beene quenched, besieged this citie. But when the warlike Arthur came upon them they tooke the hill named *Mons Badonicus*, where, when couragiously a long while they had fought it out to the uttermost, a great number of them were slaine. This hill seemeth to be the very same, which now is called Bannerdowne, over a little village near this citie, which they call Bathestone, on which there are bankes, and a rampier as yet to be seene. Yet some there be, I know, who seeke for this hill in Yorkshire. But Gildas may bring them backe again to this place: for in a manuscript copie within Cambridge Librarie, where he writeth of the victorie of Aurelius Ambrose, thus we read: 'Until that yeare wherein siege was laid to the hill of Badonicus, which is not farre from Severn mouth.'" Bannerdown would be the *Mons Badonicus* of Arthur, if Bath were the Baden of antiquity, because the Roman Road traversed it, and the English availed themselves, when practicable, of those roads in their warlike operations. Of course Mr. Sayce is acquainted with the "manuscript copie" to which Camden refers, and apparently has not been brought "backe again to the place."

CHAPTER III.

ANGLO-SAXON BRITAIN.

"We must begin by dismissing from our minds all those modern notions which are almost inevitably implied by the use of language directly derived from that of our heathen ancestors, but now mixed up in our conceptions with the most advanced forms of European civilisation. We must not allow such words as 'king' and 'English' to mislead us into a species of filial blindness to the real nature of our Teutonic forefathers. The little community of wild farmers and warriors who lived among the dim woodlands of Sleswick, beside the swampy margin of the North Sea, has grown into the nucleus of a vast empire, only very partially Germanic in blood, and enriched by all the alien culture of Egypt, Assyria, Greece, and Rome."—*Grant Allen's Anglo Saxon Britain.*

"Bath now changed both its name and its inhabitants. The classical apellations of Aquæ Solis, was converted into the more appropriate perhaps but less elegant one of Hot Bathun (hot baths), whilst its citizens, either slaughtered or driven into exile, left their residences to the ferocious followers of Ceaulin, who took possession of the place and made it an appendage to the kingdom of Wessex. It is not difficult to imagine the devastation that would be committed on the architectural ornaments of this city, originally raised by Roman labour, and afterwards decorated by Roman taste, when fallen into the hands of a fierce unlettered people, who contemned the elegancies of refinement and despised

the efforts of the arts. Its fanes and temples were destroyed, its altars overturned, and the ruins of its splendid masonry were incorporated with the walls and made to strengthen the bulwarks of the city against any future attempts of its former possessors."

Now, this is fine writing, but inconsistent with what Warner has said before with regard to the grossness and "disgusting" superstition of the Britons. It is true he afterwards refers to the probability that shortly after it "may be dated the introduction into the city of the worship of the one true God;" in other words, Christianity. Of that we have little more to direct our judgment as an historical fact than a mere "inarticulate reverberation." But one fact is clear enough, and that is that the Saxons or English at this time had made good their rule almost throughout the land, and had already manifested some of their characteristic capacity for organization and government, and they were civilized and intelligent enough to be aware that needless cruelty and wanton destruction would recoil upon themselves.

We quote a later authority than Warner on the contest at Deorham, namely Dr. Guest:—

ON THE ENGLISH CONQUEST OF THE SEVERN VALLEY.

BY EDWIN GUEST, LL.D.

* * * * * * *

"A 571. Now Cuthwine and Ceawline fought with the Brits, and three kings they slew, Commagil and Condidan and Farinmagil, in the place that is called Deorham, and they took three cities, Gleawanceaster, and Cirenceaster and Bathanceaster."

"Various conjectures have been hazarded with respect to the three kings whose deaths are here

recorded. Sharon Turner and Villemarqué consider Condidan to be the same person as the Kyndylan, whose death is bewailed in an old Welsh marwnad or elegy. But it appears clearly enough from the elegy that Kyndylan was slain near Shrewsbury, and therefore could not possibly be the Condidan who according to the chronicle was slain at Deorham in Gloucestershire. Equally unsatisfactory are the attempts which have been made to identify the other two princes, Commagel and Farinmagil. But there is one conjecture with respect to these princes which seems to merit attention, though I do not remember to have seen it noticed elsewhere. When we read that three kings were slain at Deorham, and that the three cities of Gloucester, Cirencester, and Bath surrendered, it is a natural inference that the three Welsh princes were lords of the three cities, and that it was together with the men of these cities and of the dependent districts they fought and lost the battle of Deorham. It is matter of some little interest to know, that in all likelihood the last Welshman who bore rule in Gloucester was named Commagil, or—to give the name its latinized form which may have been to him the most familiar—Cunomagulus.

"The conquest of Gloucester, Cirencester, and Bath must have made the whole valley of the Severn, east of the river and south ot Arden, English ground. It is clear from existing remains that during the Roman period Bath was a wealthy and flourishing town; Gloucester, as we know both from Ravennas and from an inscription found at Bath, was a Roman colony; and with respect to Cirencester, there was probably no town at that time in Britain—York, London, and Colchester excepted—which in importance, either civil or military, could rank before it.

These towns must have represented the district. With the exception of some insignificant road-side station between Bath and the Severn-ferry, there is hardly another place in this part of Britain whose Roman name has come down to us.

* * * * * * *

"A. 584. Now Ceawlin and Cutha fought with the Brits in the place that is called Fethan leag, and there Cutha was slain, and Ceawlin took many towns and countless booty, and angry he turned him thence to his own country (to his agenum). In their accounts of this battle Ethelwerd, Florence, and Malmesbury merely copy the chronicle. Huntingdon tells us that Cuthwine (the Cutha of the Chronicle) fell overpowered with numbers, and that the English were defeated and took to flight; but that Ceawlin again brought the army into order, and inspiring them with a stern determination, at length came off the conqueror."

"I know not whence Huntingdon obtained his knowledge of these particulars, but there is so much that is probable in his story that I would willingly receive it as true. Fordan labours hard to mix up Aidan King of Scots, in all the leading events of this period. . . . . Henry and Hume represent Somerset and Devon as the scene of Ceawline's conquests, and therefore, I presume, would locate Fethan leag with Fretherne, near Gloucester. I know of no reason for fixing on this locality, except the resemblance supposed to exist between the words Fretherne and Fethan. But who can point out any known process of corruption by which Fethan could be transformed into Fretherne? More-

over if we suppose Fretherne to be the place of the battle, where can we find room for the "many towns and countless booty" that were taken after the victory? What significance can we give to the statement that "after the battle Ceawlin turned him thence to his own country"? Fretherne was situated then in the very heart of the district conquered by the English seven years previously. It lay in the midst of the triangle dominated by the three great fortresses of Gloucester, Bath, and Cirencester, and when they fell must necessarily have fallen with them."

The following extract is from Mr. C. E. Davis's *Guide to the Roman Baths*:—

"The position of the fragments which have fallen on it, and the varied thicknesses beneath these fragments, giving a greater or less time for the deposit, and consequently an earlier or later date for their fall, showed that the destruction of the Great Bath had been at first little assisted by violence, but was the gradual progress of decay in a ruined and deserted city; whilst the upsetting of the columns of the great portico, and the dismemberment of the immense works of masonry of the well and vestibule, showed that a powerful body of men must have invaded the baths, determined to destroy and efface the work of a former or defeated people. It is possible that when the British lost the battle at Deorham in 577, and when Bath was taken and sacked, a stand was made at the baths and that there a body of the British were taken and slain, and their impromptu fortress destroyed. It would *weary them were he to give the reasons for this belief, but much could be said in its support.* He had, however, little doubt but that upon Bath being taken by the Saxons the baths were deserted, its hot waters allowed to flood

its courts and corridors, until the washings of the land in which the baths had been excavated gradually covered as a guardian the remains of their magnificence, and thus preserved them for thirteen hundred years. They are but partially revealed."

Now if this statement can be sustained, and we are not prepared to enter upon any controversy on this or any other point, it will go far to determine certain questions and historical difficulties on which the pundits greatly differ, and agree to differ. The fact would be valuable in itself, and at the same time it might clear up much that is at present most uncertain and obscure with regard to the destruction of the baths, when and by whom they were destroyed, and if destroyed by violence at all, which we at present wholly disbelieve. If the English destroyed them, even by accident, when they slew the Britons who were unwise enough to make "a stand at the baths," by whom were the Temples and Basilika, the Palaces and the Roman city destroyed? It is too much to suppose that the English, even in the fury excited by resistance, would demolish the city they were about to occupy. If buildings fall, it is difficult on any principle to measure the force with which they have been thrown down, or whether force has been used at all. If the Roman baths fell from neglect, where should they fall except into the springs beneath the superstructure? A battering-ram or any other known force of that time would have had no other effect. We seem to be in accord with the theory up to a point, but that strengthens our position and the force of our objections to the main proposition. If the English found that the great baths had already suffered so decisively from neglect, or violence, or natural decay, what more did the conquerers want? If they did knock their future

capital into ruins and desolation, they must have done it after slaying the Britons and obtaining possession. It may be assumed, or we might go further and say that it is certain, that Mr. E. A. Freeman, the historian, is not ignorant of any and every fact which bears upon this epoch, and at least if a writer even of his eminence were acquainted with the reasons from which a great historical fact might be deduced, *he* would have stated them.

The following remarks in Mr. Grant Allen's *Anglo-Saxon Britain* brings us fairly into English times :—

"The victory of Deorham has a deeper importance of its own, however, than the mere capture of the three great Roman cities in the south-west of Britain. By the conquest of Bath and Gloucester, the West Saxons cut off the Welsh of Devon, Cornwall and Somerset, from their brethren in the Midlands and in Wales. This isolation of the West Welsh, as the English thenceforth called them, largely broke the power of the native resistance. Step by step in the succeeding age the West Saxons advanced by hard fighting, but with no serious difficulty, to the Axe, to the Parret, to the Tone, to the Exe, to the Tamar, till at last the West Welsh, confined to the peninsula of Cornwall, became known merely as the Cornishmen, and in the reign of Æthelston were finally subjugated by the English, though still retaining their own language and national existence. But in all the western regions the Celtic population was certainly spared to a far greater extent than in the east; and the position of the English might rather be described as an occupation than as a settlement in the strict sense of the word."

With all the changes, earlier and later, in the destinies of Bath there has been a corresponding change of name, but each change has been germane

to the springs. They have invariably been the centre of interest and the source of prosperity and importance in successive ages. When the English conquered and occupied Bath they were supposed to have become in a measure converts to Christianity. Perhaps it had not made a deep impression upon them, but they were a people whose natural gifts had not been so tainted and polluted by the degrading superstition and vile practices of the Britons; moreover they were more susceptible of the enlightened teaching of a pure and exalted faith. And what is especially remarkable is the rapid development of the Christian faith and the forms and ceremonies which have since prevailed in all Christian communities. We believe that the alleged ferocity and brutality of the Saxons when they first visited the shores of Britain have been greatly exaggerated. Cruelty and crime were inseparable from a state of inchoate civilization, and the Saxons were not free from the reproach. We should be glad to know what the New Zealander thought of the descendants of the said Saxons when they invaded his country, and introduced civilization amongst them. To some extent we do know, and at this moment it may be that they would have preferred barbarism and their own conceptions of liberty to order and law, and whatever else that tends to make a great nation. What is so remarkable in connection with this part of our local history is that a people so barbarous and so cruel as these Saxons are represented to have been should in one short century have not only emerged from this condition, and that they should have embraced Christianity, but that they should have organized it into concrete forms, soon to be succeeded by temples and ceremonials the like of which have in later ages scarcely

been seen. In 676 Osric built a monastery,[1] and a century later Offa, King of Mercia, after conquering Wessex, built a stately Cathedral in Bath in which Edgar was crowned in 973, the description of which we give from Stevenson's edition of the *Chronicles of William of Malmesbury :—*

" But however these things may be, this is certain, that from the sixteenth year of his age, when he was appointed King, till the thirtieth, he reigned without the insignia of royalty. But then, the princes and men of every order assembling from all parts, he was crowned with great pomp at Bath, on the day of Pentecost ; he survived only three years, and was buried at Glastonbury. Nor is it to be forgotten that when Abbot Edward opened his tomb in the year of our Lord ten hundred and fifty-two he found the body unconscious of corruption. This circumstance, instead of inclining him to

1 By some writers it is said to have been a nunnery. Collinson says so, and we think the balance of probability inclines to this fact. Mr. Grant Allen, in reference to the influences exercised by the religious communities, says :—" With such a state of affairs as this, it becomes a matter of deep importance that there should be some one institution where the arts of peace might be carried on in safety ; where agriculture might be sure of its reward ; where literature and science might be studied ; and where civilizing influences might be safe from interruption or rapine. The monasteries gave an opportunity for such an ameliorating influence to spring up. They were spared even in war by the reverence of the people for the Church ; and they became places where peaceful minds might retire for honest work, and learning, and thinking, away from the fierce turmoil of a still essentially barbaric and predatory community. At the same time, they encouraged the development of this very type of mind by turning the reproach of cowardice, which is would have carried with it in heathen times, into an honor and mark of holiness. Every monastery became a centre of light and of struggling culture for the surrounding district. They were at once, to the early English recluse, universities and refuges—places of education, of retirement, and of peace—in the midst of a jarring and discordant world.

reverence, served only to increase his audacity; for when the receptacle which he had prepared seemed too small to admit the body, he profaned the royal corpse by cutting it; the blood immediately gushing out in torrents, struck terror into the hearts of the bystanders. In consequence, his royal remains were placed above the altar, in a shrine which he had himself given to this church, with the head of St. Apollinaris, and the reliques of Vincent the Martyr, which, purchased at a great price, he had added to the beauty of the house of God. The violator of the sacred body presently became distracted, and not long after, going out of the church, met his death by a broken neck. Nor did the display of royal sanctity stop thus; it proceeded still further, a man, lunatic and blind, being there cured.

"Deservedly then does the report prevail among the English, that no King, either of his own or former times in England, could be justly and fairly compared to Edgar. Nothing could be more holy than his life, nothing more praiseworthy than his justice, those vices excepted which he afterwards obliterated by abundant virtues. A man who rendered his country illustrious through his distinguished courage, and the brilliancy of his actions, as well as by the increase of the servants of God. After his death, the state and the hopes of the English met with a reverse."

Now, although we have little to guide us with any certainty, yet for three centuries it is clear the Saxon kings honoured Bath by their presence, delighted in its medicinal springs, and enriched it with their munificence.

William of Malmesbury was an optimist, and evidently regarded Edgar's peccadillos rather in

sorrow than in anger. Hume, perhaps, did not care so much about Edgar's short comings as he did in finding occasion to charge a Christian hero with moral turpitude and the ecclesiastics with winking at it. Hume on Edgar, and Macaulay on Hume may be interesting and edifying, especially as the remarks of Macaulay form a part of the remarkable Introduction to his *Lays of Ancient Rome.*

THE CROWNING OF EDGAR.

HUME.—"One of the first acts of Edgar after his accession was to promote Dunstan to the Archbishopric of Canterbury. In fact Edgar, who was only about sixteen years of age at the time of his accession, was completely governed by Dunstan and the monks who had placed him on the throne, and who, by their pretensions to superior sanctity and purity of manners, had acquired an ascendant over the people. Of the first five years of his reign we have no memorials, except of his passive co-operation in the ecclesiastical revolution then in progress. To please the monks he depreciated and degraded the secular clergy; he favoured their scheme for dispossessing the secular canons of all the monasteries; and he bestowed preferment on none but their partizans. Above forty Benedictine convents are said to have been founded by Edgar. These merits have procured him the highest panegyrics from the monkish historians, and he is transmitted to us not only under the character of a consummate statesman and an active prince, but also under that of a great saint and a man of virtue.

"If we consider Edgar's fortunate reign, he may perhaps be in some degree entitled to the former portion of this eulogy. His reign was undisturbed by any domestic tumult or foreign invasion of the Danes; a result which was probably in part owing to the large armament, both military and naval, which he constantly kept on foot, and also to the fact that the Danes had now obtained establishment in the north of France, which it required all their superfluous population to people and maintain. Being thus freed from disturbance on this side, Edgar was enabled to employ his vast armaments against the neighbouring sovereigns; and the King of Scotland, the Princes of Wales, of the Isle of Man, of the Orkneys, and even the Norsemen in Ireland, were reduced to pay submission to so formidable a monarch. But Edgar was arrogant and vainglorious, and abused his prosperity by degrading and insulting his conquered foes. On the annual occasion of his voyage round England, he once appointed eight vassal kings to attend him at Chester and to row his barge upon the Dee to the Abbey of St. John the Baptist, he himself acting as the steersman; whence, after offering up their prayers, they returned in the same order.

"The saintly part of Edgar's characterhe appears to have owed to the unscrupulous gratitude of the monks towards their benefactor; for his conduct was licentious in the highest degree, and violated every law, human and divine. Among other feats of the same kind, he broke into a convent, and carried off Editha, a nun, by force.

"The extirpation of wolves in England was a remarkable incident of this reign, which was chiefly effected by converting the money payment imposed

upon the Welsh princes into an annual tribute of 300 wolves' heads.

Edgar died in the year 975, in the thirty-third year of his age, leaving two sons—Edward, aged thirteen, whom he had had by his first wife, Ethelfleda ; and Ethelred, his offspring by Elfrida, then only seven. There can be no doubt that the former had the best claim to the succession ; and though Elfrida attempted to raise her son to the throne, Edward was crowned at Kingston by the vigorous policy of Dunstan."

Macaulay, in reference to this passage, to which we have referred, says :—

"History," says Hume, with the utmost gravity, "has preserved some instances of Edgar's amours, from which, as from a specimen, we may form a conjecture of the rest." He then tells very agreeably the stories of Elfleda and Elfrida, two stories of which have a most suspicious air of romance, and which, indeed, resemble in their general character some of the legends of early Rome. He cites as his authority for these two tales the Chronicle of William of Malmesbury, who lived in the time of King Stephen. The great majority of readers suppose that the device by which Elfrida was substituted for her young mistress, the artifice by which Athelwold obtained the hand of Elfrida, the detection of that artifice, the hunting party, and the vengence of the amorous King, are things about which there is no more doubt than about the execution of Anne Boleyn, or the slitting of Sir John Coventry's nose. But, when we turn to William of Malmesbury, we find that Hume, in his eagerness to relate these pleasant fables, has overlooked one very important circumstance. William does indeed

tell both the stories ; but he gives us distinct notice that he does not warrant their truth, and that they rest on no better authority than that of ballads.[1]

John de Villula, Bishop of Bath and Wells, who died in 1122, richly endowed the church of St. Peter (the Abbey) in 1106; and, for the convenience of the monastery, built two new baths within its precincts, one of which, called the Abbot's Bath, he gave to the public use, and the other for the Prior. "He did not," says Lucas, "rebuild those of the Romans, the foundation and ruins of which were buried under his palace; but he enclosed the heads of the chief springs then known, with strong though rude cisterns, which remain, with very little improvement, to this day."[2] *Wood* states that both the above baths were given to the public; this took place perhaps at a later period. The baths went by the name of the Abbey Baths for some time, and were supplied with water from the spring in the King's Bath.[3] John de Villula, also, erected a considerable edifice for his own residence, which was called the

1 To reckon up here the Kings of the West Saxons that were buried in this place would be but needlesse: Howbeit, King Edgar, the Peaceable, who alwaies tendered peace in regard thereof, if there were nothing else, I cannot but remember and put downe his Epitaph, not unbeseeming that age wherein he lived.

That well of wealth, and scourge of swine, that honour-giver great,
King Edgar hence is gone to hold in heaven his royall feast;
This second Solomon that was, laws-father, Prince of Peace,
In that he wanted warres, the more his glory had increase.
Churches to God, to Churches monkes, to monkes faire land he gave,
Downe went in his daies wickednesse and justice place might have:
A pure crowne for a counterfeit he purchased once for all,
An endlesse kingdome for a short, a boundlesse for a small.

2 "An Essay on Waters," part iii., pp. 243, 244.

3 "Leland's Itinerary," by Hearne, vol. ii., p. 38. 1744

Abbey House (afterwards known as the Royal Lodgings)[1]—which was demolished in 1755, and its foundations removed, during which process the stone coffins and coins were found, and also the remains of the Roman Baths before mentioned. At this time the spring which supplied the latter baths was accidentally discovered.[2] On the site of the Abbey House[3] new baths were erected, the building of which, by the Duke of Kingston, was commenced in 1763 or 1764, and completed in 1766. They were for some time known as the Abbey, or Roman Baths,

1 *Vide* Gilmore's Plan of Bath, with engravings of some of the principal edifices. 1694. A further reference to this will be found in the notice of Peirce in the *Lives of the Physicians.* It will be shown that the "considerable" edifice of the first Bath bishop and the Abbey House were distinct buildings.

2 There appears formerly to have been no little doubt as to this spring, i.e., whether it was an independent spring or a leakage from the spring of the King's Bath. From the following extract, taken from a recent report presented by the City Architect to the Hot Waters Committee, it appears that no independent spring exists:—"The Committee at once saw that such course should be pursued, at the same time they felt that there were almost insuperable difficulties to be surmounted before it could be carried out. Moreover, it was thought unwise to state the precise circumstances of the case which an application to the Council might make public. No steps could be taken unless the Committee were possessed of the 'Kingston Springs,' as they were called, which springs were really leaks, more or less diluted from the great springs, the property of the Corporation. To make the required excavations a drainage of the land was necessary, altogether absorbing the Kingston Springs, which it was clear could not be done without their being in the possession of the Corporation. The Chairman of the Baths Committee (the late Alderman Lewis) saw the necessities of the case, and endeavoured in the first place to urge upon the Committee the importance of their purchasing these hot Kingston Springs, and after, I think, six years negotiation, in 1877 or 1878, they became the property of the Corporation."

3 We give the text of the two statements as to De Villula's Palace and the site of the Kingston Baths; but they are erroneous, as we shall conclusively show in our notice of Dr. Peirce in *Lives of the Physicians.*

then as the Kingston, or Old Roman Baths, notwithstanding there is not any reason to believe that traces of the latter are to be found, excepting probably the channel through which the hot water is conveyed from the spring to the baths. Derrick, in one of his letters, writing of these baths, says, "They will be of vast utility here; for the other baths, being uncovered, and exposed to all weathers, and every eye, are therefore disagreeable to many people."[1] The baths are no longer used, ample provision of a more luxurious character having been provided, in the Royal Baths.

In 1138, Robert, Bishop of Bath and Wells, founded a hospital for Lepers, and dedicated it to St. Lazarus, attaching to it at the same time a bath, called the Lepers' or Lazours' Bath; it was supplied by the overflowings of the spring in the Hot Bath, to which it adjoined. Johnson, in his work on the Bath Waters, published in 1634, mentions this bath. It was still to be seen, but little used, in 1773; the period at which it was destroyed is uncertain. The Hospital was a small building, furnished with seven beds, situated at the corner of "Nowhere Lane," now Hot Bath Street, and was so near to the bath that the inmates were under little or no difficulty in passing from one to the other.[2] There were many institutions founded by the late Saxon Bishops in connection with the Waters. Dudoc, the

1 Letters, vol. ii., p. 111.

2 Wood, "Description of Bath," vol. ii., p. 306. It may throw some light on these early charities if we quote a note from Mr. Peach's "History of the Hospital of St. John the Baptist":—"Some of the earlier institutions outlived the objects for which they were established, and in some cases merged in other more useful and practical institutions. In many instances endowments for special diseases have been absorbed by modern Hospitals, in which provision is more amply made for the treatment of such diseases; in other cases the diseases themselves no longer

penultimate Saxon Prelate, established a Zenodochium for indigent and diseased strangers. No evidence of any endowment exists. In fact such institutions were purely eleemosynary, varying with the changes and needs of those for whose benefit they were established. They were invariably under the management of and were supported by the Church.

The baths remained in the hands of the Priors and Monks of the Benedictine Monastery of Bath

prevail. Leprosy, for instance, which was common in this country even as late as the early part of the last century, is now unknown, and the provision, therefore, such as it was, made by Bishop Robert de Maud, in the 12th century, became an anachronism, and finally merged in Bellott's Hospital. Specific gifts, too, have by legal authority also merged into existing institutions, and most wisely so. The spirit of benevolence and charity by which provision was made in past ages for the poor was noble and wise; it contrasted very emphatically, as the history of S. John Baptist will show, with the rapacity and the dishonesty of the Reformation and later periods, when public bodies, and the clergy especially, robbed the poor of their inheritance, and appropriated riches which were left for the suffering indigent. This is all now changed. If we no longer get endowments as formerly, more ample and adequate provision is made for the poor through the old spirit of liberality, which still exists, and is carried out by all classes of the community. Moreover, if the Mediæval Church and Laity made special provision for exceptional diseases, how much more is done in every large community for the treatment of every species of complaint needing special skill and special attention! And it may be observed that whilst Christian benevolence was never so active, so unceasing in dealing with all the ills which human flesh is heir to, so in like manner is the higher duty recognised of ministering Christian consolation and comfort to every sufferer brought within the range of every institution in the country. Besides the Hospital itself, several buildings were assigned for the use of the lepers. Leprosy prevailed to a great extent during the middle ages, but it is probable that all serious skin diseases were treated as cases of leprosy. The houses were set apart for travelling mendicants, whilst the hospital itself was reserved for resident patients. The Hospital stood at the upper corner of the south side of Nowhere Lane, close to the Lepers' Bath. The Hospital was a small structure, and the later building of Queen Elizabeth's time no doubt stood upon the same site. It was a small, wretched 'hovel,' yet it contained seven beds, which, until the

until the dissolution of religious houses in the time of Henry VIII., and in consideration of their receiving the proceeds, which arose from the use of the baths, they were to keep them in repair, fit for the reception of Royalty. In 1235, however, it appears that they neglected their duty, receiving the profits, but leaving the baths to decay. This neglect brought upon them the Royal displeasure, as appears by the Pipe Roll, 20 Henry II.[1]

---

close almost of the last century, were occupied by patients suffering from this loathsome disease. Hugh de Wells, in his will, besides other bequests to relations of Bishop Robert de Maud, and 30 marks, in honour of the Bishop himself, the founder of the Hospital, leaves 100 marks for the Lepers' houses, 100 marks for the Hospital, and then he adds:—'300 marks for buying books and X ornaments for the Bath Churches.' The building of Elizabeth's time is thus described by Wood:—'The Lepers' Hospital is a building of eight feet six inches in front, to the East, on the ground floor, fourteen feet in front above, and thirteen feet in depth; but yet it is furnished with seven beds, for the most miserable of objects who fly to Bath for relief from the hot waters. This hovel stands at the corner of Nowhere Lane; and it is so near the Lepers' Bath that the poor are under little or no difficulty of stepping from one place to the other.' The Hospital seems to have merged into Bellott's institution."

1 Prior Bathon reddit computum de xx li de firma de Burton sicut continetur ex alia parte Rotuli; Et de xxx li de firmis civitatis Bathonie quam tenet per talem firmam quamdiu Regi placuerit:—In Thesauro axxvi li et ix s. *et in domibus Regis in villa Bathonie que reparacione indigent et muro circa balneum regis ibidem reparandis: xlj li xj per breve regis et per visum et testimonium Johannis Petit et Johannis Wische.*

Et quietus est.

The Prior of Bath renders his account of £20 for the ferm (i.e., rent) of Burton: as is contained in another part of the Roll; and of £30 for the ferms (rents) of the City of Bath which he held by such rent during the King's pleasure. At the Treasury he pays £36 9s.; and in repairing the King's houses in the city of Bath which are out of repair and the wall round the King's Bath [he has allowed him] £13 11s. by the King's writ, testified by John Petit and John Wische.

1-3 Cash	...	...	£36	9
Credit for Repairs	...	...	13	11
And his account is allowed.		Total	50	0

The literature of the Baths has been to a large extent the sport of many writers. Guidott was a chartered libertine; he roved at pleasure, and did not care always to tell the whole truth, even when he knew it. Why he should have quoted only ten lines of Necham's poem when the original consists of 36, we cannot say. Spry copied Guidott, without knowing that he was quoting only a fragment, and adds one error to the three made by Guidott, and another by calling the author Necha*n* instead of Necha*m*. Later writers have literally copied Spry with all his errors, gracing them with one of their own, and at the same time styling Necham a "poet of the thirteenth century." Again, Guidott sets a bad example with reference to the satire on *Unfortunate Princes*, by the Italian poet, Boccacio, and the process is imitated with an accretion of further mistakes. If it be pleaded that these errors seriously concern no one we are ready, in a sense, to admit the plea, only, we ask, why quote at all? Guidott might in his day call Lord Burghley *Lord Cecil*, and Bellott one of his executors; but surely in this age we might know Cecil by his correct designation, and Bellott by his long friendship with the great statesman, his honourable connection with Queen Elizabeth's household, and afterwards with that of James; his close friendship also with Burghley's son, Salisbury, to whom, as well as his father, Bellott was executor.

We think these ancient poems are worth giving in extenso and correctly, and we will endeavour to render them so. They are characteristic of the period in which they were written, and they afford us glimpses of the baths, which, strange to say, are so rarely mentioned before the reign of Elizabeth. Camden, like Guidott, gives ten lines of the original poem, but

his translation extends it to fourteen lines, and is far better both in the diction and versification.

Alexander Neckam[1] (according to modern spelling) was born 1157 at St. Albans, and from this circumstance was sometimes called Alexander de Sancto Albano. In contemporary MSS. it is written Necham. He was in his own time in joke called, in Latin, "Nequam" (*i.e.*, bad). The preface to the volume printed by the Record Office, mentions his application to the Abbot of St. Albans for admission there. "Si vis, veniam: sin artem," &c., wrote Neckam: to which the Abbot replied: "Si bonus es, venias; si nequam, nequaquam."

Necham's poem, entitled "De Laudibus Divinæ Sapientiæ," says:—

(p. 401; Edit. by Thos. Wright, 1863.)

Bathoniæ thermis vix præfero Virgilianas;
Confecto prosunt balnea nostra seni.
Præsunt attritis, collisis, invalidisque,
Et quorum morbis frigida causa subest.
Prævenit humanum stabilis natura laborem,
Servit naturæ legibus artis opus.
Præcedit natura potens, industria solers
Subvenit, his junctis nobile surgit opus.
Præsternit natura viam quam dirigit artis
Regula, si fidus sit comes usus ei.
Arti sunt igitur obnoxia balnea partim,
Partim naturæ, sulphure fervet aqua.
Sulphur nempe soli pyr dicitur, ignis in ipso
Vivit, et effectum nutrit in amne suum.
Igne suo succensa quibus data balnea fervent,
Ænea subtus aquas vasa latere ferunt.
Errorem figmenta solent inducere passim,
Sed quid? sulphureum novimus esse locum.

1 "Necham was destined to greater honour. Alexander Necham, a great Clerk and Abbate of Cirencestre, buried in the entring of the Cloister of Wiccestre, entering out of the Chirch in the Cloyster. King Henry the First made the Hospital of St. John at Cirencestre. Cirencestre town hath but a Bailife to govern there. Cirencestre is yn Coteswolde." Reference is also made to Necham in Leland, vol. 6, folio 54, and vol. 8, folio 113.

Suave tamen redolent virtutem cinnama, myrrha,
Cassia, cum gutta, fistula spirat ibi.
Nam suavem Domino devotis reddit odorem,
Et floret sancta relligione locus.
Ad fontes iterum sitiens properansque revertor,
Est aliquid puro vincere fonte sitim.

Sunt fontes calidi brumali tempore cum sint
Æstivo gelidi, certane causa subest?
Conclusis poris terræ brumalibus horis
Fumi descendunt, interiora calent.
Exhalat liber æstivo tempore fumus,
Exclusis fumis frigida terra manet.
Sic stomachis regnat calor auctus tempore brumæ,
Quo cultus mensæ lautior esse solet.
Sed stomachus frigit dum terra perusta calore
Ignis Phaetontis commemorando timet.
Adjice quod puteus consetur nomine fontis,
Telluris thalamo frigidiore latens.

At p. 457:—

Balnea Bathoniæ ferventia tempore quovis
Ægris festina sæpe medentur ope.

[TRANSLATION.]

The baths of Virgil scarce would I prefer
To those far-famed of Bath, for haply, there
The frail grow vigorous, the weakling strong,
And there the aged man once more grows young.
Those too find health who suffer ills untold,
That have their origin in winter's cold,
Where Art discovers remedies too late
There Nature's laws man's toil anticipate.
Art's industry with Nature, both combined,
Oft much success and grand achievements find.
When Nature beckons, then doth follow Art
And both succeed, where one would fail in part.
So both to Nature and to Art 'twould seem
The baths are subject; for the waters' stream
Abounds with sulphur, called "the fire of earth'
And here it is the sulphur springs have birth.
Some say that in the earth are pots, forsooth,
Of brass, which heat the waters. Is it truth?
It matters little whether false or true—
The sulphur's there, full well know I and you.

And yet amid the fumes sweet scents are there
Of cassia, bark, and cinnamon, and myrrh,
And with the plash of water all day long
Is heard the flute's clear melody of song,
A holy fame the place too seems to bear
For sanctity's sweet odour fills the air.
Again I thirst, again I quick return,
And with the waters pure soon quench the burn.

Warm are the waters all the winter-tide,
The pores of earth are closed, when frosts abide,
The fumes descend; earth, nourishing the heat,
Pours forth its sulphur stream with health replete.
When summer comes, out burst the fumes amain,
The stream grows cold, for earth is cold again.
So, stomachs heat, when winter shows his might
Then meats well seasoned tempt the appetite,
But when the sun pours out his scorching heat
(Reminding us of Phaethons mad feat)
Then we are subject too to Nature's rule,
Then fails the appetite, and stomachs cool.

And add to this, the waters upward led
Have their first origin in earth's cold bed.

At p. 457:—
The sulphur baths of Bath are warm alway,
Taste, and be healed, with all the speed ye may.

Necham's verses (Camden's translation):—

Our Bathes at Bathe, with Virgils to compare
For their effects, I dare almost be bold:
For feeble folke, and craisie good they are,
For cruis'd, consum'd, far-spent and very old:
For those, likewise, whose sickness comes of cold.
Nature prevents the painful skill of man;
Arts worke againe, helps nature what it can.
Men thinke these Bathes of ours are made thus hot,
By reason of some secret sorce of fire,
Which under them as under brazen pot
Makes more or lesse, as reason doth require,
The waters boile, and warme to our desire;
Such fancies vaine, use errors forth to bring,
But what; we know from Brimstone veines they spring.

Guidott, in his letter written to Sir Edward Greaves, formerly a Bath physician, and afterwards

physician to Charles II., whom he accompanied to Bath (page 49, 2nd edition), says :—

"It hath been indeed the ill fortune of these baths (which I may truly say are as good if not better than any baths in the world) to lie a long time in obscurity, and not so much as to be mentioned among the baths of Europe by any foreign writer, till about the year 1570, when that excellent person, Sir Edward Carne, sent Ambassadour by Queen Elizabeth to Pope Julius the Third, and Paul the Fourth, made some relation of them to that famous writer, Andreas Baccius,[1] then at Rome, and writing an elaborate Book, De Thermis, into which he hath inserted them, upon his relation, Lib. 4 Cap. 15 (though somewhat improperly) among sulphorous Baths."

Now, this reference by Guidott to *Andreas Baccius*, has been commonly supposed to refer to the same writer referred to on page 69,[2] as John Boccaci, but it is not so; they were distinct writers. What, however, is especially to be noted is that there appear to be two errors in Guidott which (unless we are altogether in the wrong our-

1 Andrew Baccius, a native of Ancona, practised medicine at Rome, towards the end of the 16th century. He was physician to Cardinal Ascanio Columna, and afterwards to Pope Sixtus the Fifth. A man of indefatigable industry, and of great genius and learning, as his numerous publications testify. The principal of them, "De Thermis Lacubus Fluminibus, et Balneis totius Orbis," lib. vii., was first printed at Venice, 1571; again 1588; then at Rome, 1622; at Padua, 1711, folio. The last edition is augmented with an eighth book, containing analyses of the different mineral waters, with observations extracted from other writers on the subject. We have also of this author, treatises, "De Venenis, et de Antidotis," 4to, Rome, 1586; "De Dignitate Theriacæ," also 4to, Patavii, 1583; "De Naturali Vinorum Historia, de Vinis Italiæ, et de Conviviis Antiquorum," vol., Rome, 1596; "De Gemmis et Lapidibus prætiosis, de eorum viribus et usu," 12mo., Francf, 1603 and 1643; with various other works. Haller, Bib. Med. Pract., p. 157.

2 Guidott's Treatises, 2nd Edition.

selves) have misled all subsequent writers on the Bath Waters. *John Boccaci* manifestly refers to *Boccacio*, the author of *The Decamerone*, but he was born in 1313 and died 1375, nearly a century before the John Boccaci of Guidott is said to have flourished and written the poem on Bladud and the Waters, translated by "*Daniel Lidgate.*"

We will endeavour to make this clear. Lydgate, whose name was John, not Daniel, was a monk of Bury, and he, in 1494, not 1450, as Guidott says, translated Boccacio's *Rhyming History of Unfortunate Princes*, a fitting subject of which was the illustrious Prince Bladud. Boccacio was using some legends much older than his own time, and the fabulous story of Bladud he would have got from Geoffrey of Monmouth. Now, something more than eighty years after Lydgate translated Boccacio's *Rhyming History, &c.*, Higgins published his *Mirour for Magistrates*, in the "first parte" of which he gives the same legend.

The first parte of the Mirour for Magistrates, containing the falles of the first infortunate Princes of this lande, &c., &c., B.L. 4, 1574. (By J. Higgins.)

In this very scarce little work there is a poem of seventy-nine verses. The verses relating to Bath are here given :—

BLADUD RECYTETH HOW HE PRACTI
ȝinge ȝp curſous arts to flye, fell and
BROKE HIS NECKE. THE YEARE BEFORE
CHRIST 844.

This version, be as it may, is more rhythmical and correct than that Guidott attributes to Boccacio and his translator, Lydgate, and we suspect he was quoting at second hand.

Some say I made the batthes at Bathe,
And made therefore two tunnes of brasse;
And other twayne seuen saltes that haue
In them, but these he made of glasse.

With sulpher fylde, and other things,
Wylde fire, saltgem, salte peter eke;
Salte armoniake, salte Alchime
Salte comune, and salte Arabecke.

Salte niter mixid with the rest,
In these fowre tunnes by portions right;
Foure welles to laye them in were dreste,
Wherein they boyle, both daye and night.

The water springes them rounde about,
Doth ryse for ay and boyleth still;
The tunnes within and eke without,
Do all the welles with vapoures fill.

So that the heate and clensing powre,
Of sulpher and of salts and fyre;
Doth make the bathes eche pointed houre,
To helpe the sickly health desyre.

These bathes to soften sinewes haue
Great vertue and to scoure the skin;
From morphew white, and blacke to saue,
The bodies faint, are bathde therein.

For leprye, scabs, and sores are olde,
For scurfes, and botche, and humors fal
The bathes haue vertues many folde,
If God giue grace to cure them all.

The ioyntes are swelde, and hardned milte;
And hardned liver palsits paine,
The pore and itche, if worke thou wilt,
By helpe of God it heales againe.

Shall I renege I made them then;
Shall I denye my cunning sounde;
By helpe I had of learned men,
Those worthy welles in gratefull grounde.

I will do so: for God gaue grace,
Whereby I knewe what nature wrought;
And lent me lore to finde the place,
By wisdome where those welles I sought.

(Then, trying to be more clever, he makes himself wings and comes to grief.)

CHAPTER IV.

"Use three Physicians,
Still-first Dr. Quiet,
Next Dr. Merry-man
And Dr. Dyet."

Regimen Sanitatis Salernitanum.

"Nothing is more estimable than a Physician who, having studied nature from his youth, knows the properties of the human body, the diseases which assail it, the remedies which will benefit it, exercises his art with caution, and pays equal attention to the rich and the poor."

Voltaire.

PHYSICIANS, ANCIENT AND MODERN.

Prebendary Scarth, in his Aquæ Solis, writes in reference to Roman Physicians :—

"It is most probable that a school of medicine existed in Bath at an early period. The mineral springs being visited by many patients for their healing benefits, would naturally cause the residence of eminent physicians in the neighbourhood. No record, however, has been found of any patients, nor have we any Votive Altar put up by a physician, as at Chester, or any memorial to a physician as on the line of the Roman wall in Northumberland.

"A solitary medicine stamp is all that has been discovered to indicate the practice of medicine in Bath in Roman times, and it seems probable that this was the stamp of an empiric. This medicine stamp was dug up in the Abbey Churchyard in 1731, in making a cellar. It passed into the possession of Mr. Mitchell, of Bristol, about the middle of the last century, but it cannot now be traced.

"It was a stone of greenish hue, perforated, and of oblong form. At the time of the discovery it was shown to the Society of Antiquaries, and casts of the impressions upon it were presented to that body by Mr. Lethiecullier; three of them are still preserved in their museum.[1]

"In 1788, Mr. Gough published in Archæologia,[2] 'Observations on certain Stamps and Seals used anciently by oculists.' Dr. Simpson, of Edinburgh, has also done much to elucidate the reading of the inscriptions on this stamp; and Dr. McCaul, president of University College, Toronto, has, with much learning and critical acumen, suggested very probable emendations in the former readings.[3]

"The legends on the four sides are as follows:—

1. T. IVNIANI THALASAR.
   AD CLARITATEM.
2. T IVNIANI CRVSOMAEL
   IN M AD CLARITATEM.
3. T JVNIANI DIEXVM
   AD VETERES CICATRICES.
4. T JVNIANI PHOEBVM AD LV.
   ECOMA DELICTA A MEDICIS.

1 MS. notices of the stamp are preserved in the Mem. Book of the Society of Antiq., vol. iv. (1744), page 210, and also in vol. viii. (1757), page 29.

2 See "Edinburgh Med. Journal," March, 1861.

3 See Brit. Rom. Inscrip., p. 176.

"I have here given the amended readings, as the two last inscriptions seem to have been copied imperfectly, and are therefore doubtful. In No. 3, the initial letters of the last word are in a rude Brittano-Roman character, and their meaning can only be conjectured. The plaster cast of this side has been lost.

"Dr. Simpson observes that the 'fourth legend appears the most puzzling of all the inscriptions hitherto found upon the Roman medicine stamps discovered in Britain.' The word, however, after the name of the vendor of the medicine, T. Jvnionvs. appears to be Phoebvm.

"To add to the difficulties of interpreting this stone, the spelling of the original has been executed very carelessly by the engraver. Thus, in No. 2, we have Crsomaelinvm for Crysomelinvm; and, in No. 1, Thalaser for Thallasser.

"In No. 4, the word Levcoma has been read Qvecvmo, but Dr. McCaul suggests Qvecvmqve, the e being used for æ, and the final q for qve.

"In No. 4, Phoebvm has also been read Phorbivm. The Phorbium, according to Galen, 'possesses attenuating, attractive, and discutient powers. They apply its seeds, mixed with honey, to Leucoma, and it is believed to have the power of attracting spicula of wood.'

"The word Delicta is conjectured by Dr. McCaul to be Relicta, and used for derelicta, as in Orelli, n. 1518. Thus the word would admit of two interpretations, either 'badly treated' or 'given up' by the Physicians.

"The stone may therefore read thus :—

1. The Thallasser of Titus Junianus for clearing the eye-sight.
2. The Crysomelinum of T. Junianus for clearing the eye-sight.
3. The Diexum or Dryxum of T. Junianus for removal of old scars.
4. The Phœbum (or Blistering Collyrium) of T. Junianus, for such hopeless cases as have been given up by the Physicians.

"The name on each of these stamps is that of a Collyrium, or eye-salve.

"The Diexvm, or Dryxvm, or Drvcvm, probably from δρυς, an oak, may have been composed of gall nuts, and used as an astringent.

"The name Phoebvm is not known as a Collyrium, but Phorbivm was used by the ancients; or the word, as Dr. McCaul observes, may be Phoedvm, the Latinized form of ΦΟΙΔΟΝ or ΦΩΙΔΟΝ, derived from ῥωζω. If the word be Phoebvm it is used in the sense of 'Radiant' or Appollinarian.

"Other Medicine Stamps have been found in this country, as at Cirencester[1] and Wroxeter.[2] Dr. McCaul observes that, of the Roman remains scattered over Europe, probably none present greater difficulties to the antiquary than Medicine Stamps. The subject has, however, been explained and illustrated by Spon.

"Chishull, Caylus, Saxe, Walche, Gough, Tochon, Sichet, Duchalais, Way and Simpson, as well as in the work of Dr. McCaul on Roman Inscriptions, whence much of the explanation which is here given has been obtained."

Now all this is very interesting, but it gives us no information as to any particular line of treatment

1 See Corinium, by Prof. Buckman and Mr. Newmarch.
2 Archæological Journal, vol. xvi., p. 66.

adopted by the Roman physicians in relation to the Baths; on the contrary, it tends to confirm the general impression that the Romans regarded the thermal springs simply and altogether as a means of luxurious indulgence. The use of the baths and the habitual energy of this remarkable people kept them healthy, whilst the physicians prescribed the "eye salve" and attended to such like small domestic ailments. Historically the learned Prebendary is not able, with all his coadjutors and contemporaries, to give us much information as to the functions of the physician or the bone-setter. In his "Roman Britain," page 248, the Rev. Prebendary supplements the information in Aquæ Solis. :—

"Another Greek altar to Asklepios, or Æsculapius, was found at Ellenborough, near Maryport, Cumberland, with the following inscription:—

ΑΣΚΛΗΠΙΩ
Α . ΕΓΝΑΤΙΟΣ
ΠΑΣΤΟΡ . ΕΘΗΚΕΝ.

"To Æsculapius Aulus Egnatius Pastor set up this" (altar). —(See "C. I. L.," vol. vii., p. 85.)

"A Greek altar, found at Chester, is dedicated by Hermogenes, a physician, to the 'Gods, the preservers, the ever-abiding.'

θεοῖς σωτ[ῆ]ΡΣΙΝ
υπ ΕΡΜΕΝΕΣΙΝ
ΕΡΜΟΓΕΝΕΣ
ΙΑΤΡΟΣ ΒΩΜΟΝ
ΤΟΝΔ ΑΝΕΘΗΚΑ.

"This altar, among others, bears testimony to the Roman forces in Britain having been supplied with medical officers. Hermogenes has been supposed to be the physician of Hadrian,[1] and the form of the

1. Dio., 69, 22.

lettering of this inscription would fix it about that time, but there are many other physicians recorded who bore the same name.

"A memorial stone to a physician was found at Borcovicus (Housesteads), a station on the line of the Northumbrian Wall. The inscription is as follows:—

D . M .
ANICIO
INGENVO
MEDICO
ORD COH
I. TUNGR
VIX. AN. XXV.

"The stone is very perfect and the lettering clear. At the top is a rabbit underneath a wreath, apparently of olive, and the corners are filled with circular shields. This has led to the supposition that Anicius Ingenuus, the physician to whom the stone is erected, was a native of Spain, the rabbit being the emblem of that country. It was placed by the first cohort of the Tungrians, as a mark of respect, and shows that Ingenuus died at the early age of twenty-five years.

"Another dedication by a medical officer was discovered some years ago at Vinovium (Binchester), near Bishop Auckland, co. Durham:—

[AES] CVLAPIO
[ET] SALVTI
[PRO SALV] TE ALAE VET
[TONVM] C. R. M. AVRE
[L. CRYS] OCOMAS. ME
[V. S.] L. M.

"The figures of Æsculapius and Salus are sculptured on this altar. Æsculapius is grasping the left hand of Salus with his right, and his left hand rests on the neck of a serpent.

"These two inscriptions are set up, the one by a cohort of Tungrians, and the other by the physician of an ala of Spanish cavalry, but physicians to the legions, and prætorian cohorts have been found in other countries; and this shows that the Roman armies were provided with medical officers and also the Roman fleets.[1]

" Notices of physicians who attended those Roman Emperors who visited Britain have been preserved. Thus, Scribonius Largus is stated to have accompanied Claudius,[2] and Severus was attended by his own physicians, as we learn from Herodian, who also informs us that his unnatural son, Caracalla, attempted to induce his father's medical attendants to hasten the Emperor's death. Having failed in this, he afterwards, when Emperor, caused the physicians to be put to death for not complying with his suggestions."—*Roman Britain, by Rev. Prebendary Scarth.*

After the time of the Romans, during the whole of the Saxon rule, we can find no reference made to medicine, nor to the profession of medicine. It is not to be supposed that regard to health and some kind of scientific education and skill were unknown. But after the introduction of Christianity and the establishment of Religious Houses in the sixth and seventh centuries, sickness and disease were brought under the care and treatment of the universal brotherhood and sisterhood of those Houses. Individual eminence was neither sought nor attained, and the will, the energy, the knowledge

1 See "Inscriptiones Regni Neapol. Latinæ," No. 2,701.

2 See Sir Thomas Brown's "Hydriotaphia;" also "Histoire de la Médecine," vol. ii., p. 54 (Jourdan's translation), cited by Sir James Y. Simpson, Bart., M.D., D.C.L., in his "Archæol. Essays," vol. ii., p. 225.

of men and women, were merged in the community banded together for the sole object of accomplishing the largest amount of good in the aggregate. This much is certain, that Christianity, in so far as it consisted in tending the weak and suffering; in so far as it meant the promotion of humane, gentle, and beneficent purposes by organized combinations, was realized most fully in those early monastic retreats. Every ecclesiastic was more or less a physician, and the secular canons were trained to habits of nursing and helping the weak and the abject. In all this work, in the work of diminishing human suffering and ministering to human happiness, woman then, cultured by Christian graces and religion, was supremely valuable. She understood the mission then as she does now. Nature implanted the gift and Christianity developed it.

> "A woman with a lamp shall stand
> In the great history of the land,
> A noble type of good,
> Heroic womanhood."

The Norman Conquest, so far as our city is concerned, introduced to us a physician in our first Norman Bishop, *John de Villula*. Some of our local writers have stated that he practised in the city, before his ordination and elevation to the Episcopate. But this cannot have been so. It is probable he may have followed his original profession in Tours, before he took Holy Orders.[1] He was raised to the Episcopate *per saltum*, and succeeded the last Saxon Bishop *Giso*, at Wells, in 1088, and, three years later, was translated to Bath, which be-

1 Henry of Huntingdon calls him "Johannes Medicus." William of Malmesbury hints that he was an empiric and a quack, but William was a Monk who took part with the Bath Monks against John the Bishop when he stirred them up to diligence and greater religious activity.

came the sole head of the See. It does not appear, therefore, at all probable that the Bishop practised medicine either in Bath or elsewhere in England.[1] Moreover, the charges made against him of Simony and quackery are not sustained by the least evidence. That he was learned, wise, and benevolent, is beyond all doubt; and, if he incurred the hostility of the monks, it was because he corrected abuses, and exercised an enlightened and vigorous judgment in the administration of his diocese and the affairs of the city, which in a sense he may be said to have reformed.

In 1057 the Cathedral of Offa, which had been nearly destroyed by the Danes, and partly restored by Elphegus, was, with much of the city, destroyed by fire. The grand prelate rebuilt the city, and erected a Cathedral the like of which for grandeur and beauty was only equalled by the later structures of Wells and Gloucester. In his life he was simple and fearless; in his death he was resigned; and he provided that whatsoever he had began in life should be completed after his death. It seems that the Baths he restored or constructed, no doubt of Roman origin, were within the limits of the Monastery, one called the Bishop's Bath, and the other the Prior's Bath, were for the free use of the public, and the Bishop's medical experience no doubt impelled him to this act of beneficence. The monastic and the episcopal jurisdictions were not at this time co-ordinate; nor did they become so, until Bath ceased altogether to be the head of the See. The palace, for

1 On page 12 of *The Municipal Records*, edited by Messrs. King and Watts, it is stated that "This prelate practised physic, and, attracted by the healing qualities of the hot springs, proved himself a beneficent patron of the city." This seems to imply that he "practised physic" in Bath, but we cannot find a trace of evidence to prove it. If it mean that he had at some time or other "practised physic," which had quickened his sympathies and "attracted him to Bath," we fully agree with the statement.

instance, built by the Bishop, was not within the Monastic limits, but south-west of them; and Leland refers to the ruined tower, which was remaining in his time and which stood immediately over the recently uncovered Roman Bath. The late Dr. R. W. Falconer and others have erroneously asserted that John de Villula's palace was identical with the Abbey House (afterwards known as the Royal Lodgings). The Abbey House, or Priory, was contemporary with the Abbey itself in its inception, but was the first completed,[2] and almost from that time until its demolition in 1755 it was neither more nor less than a large private hospital, identified with much that is interesting in our annals, and of which frequent mention will have to be made in this chapter. It is probable that the building was used for a brief period as a monastery, but there is no absolute evidence of the fact. The only presumptive evidence is the incident which occurred at the time of the demolition of the house, when the workmen came upon a built-up passage or closet, on opening which they observed a large number of vestments, which, on the admission of the air, almost instantaneously crumbled into dust.

But from the fact of these Baths being so reconstructed and placed so immediately under the direction of the Monastery it may be assumed that they

2 About 1520. Leland's exact words, written twenty years afterwards, are—"This John of Tours erected a Palace at Bath in the South West side of the Monasterie of St. Peter at Bath, one great square Tour of it, with other Ruines, yet appere." This leaves no doubt of the facts. It would be just as true to say, in face of such an assertion, that the Guildhall was built by Inigo Jones. Leland's words were written at least twenty years after the Abbey House was built, and no exercise of ingenuity could make two distinct buildings stand upon the same site. Dr. Falconer, as we have said, made the same statement in the last edition of the work we are partly incorporating, but we know that Dr. Falconer, on the error being pointed out to him, at once admitted it, and proposed to correct it in future editions.

were used exclusively for charitable purposes. The whole of the springs, we know, were under the absolute jurisdiction of the ecclesiastical authority, but those without the Monastic limits were not under the management of that body. The supremacy of the Prior and his coadjutor legally continued down to the Dissolution, although the civil authority had from time to time made encroachments upon it. No definite legal authority was, however, possessed by the Corporate body until Queen Elizabeth granted it in her Charter of 1599. "We have granted and confirmed, and by these presents, for us, our heirs and successors, do grant and confirm, to the aforesaid Mayor, Aldermen and Citizens, and to their successors, all and singular such and the same waters, baths," &c., &c. This, if it bring us to a more definite, by no means brings us to the most satisfactory phase of the history of the waters. The baths of the Monastery had been closed, when De Villula's Cathedral was demolished,[1] and apparently forgotten; and notwithstanding, practically, the city was free to deal with the Baths as its governing body thought proper, fifty years before it obtained Royal authority to do so, they had made no progressive improvement during that time. The poor were deprived of their wonted aid, the Lepers' Hospital and other institutions were neglected. Bellott, who was the incarnation of human goodness, it is true, partly supplied the want, which was so severely felt through the dead hand of selfish indifference which appears to have been laid upon the city.

1 It is a coincidence not to be overlooked, that the great Cathedral which he built, and the Baths which were coincidentally reconstructed with it, should have been demolished at the same time.

A great transition had taken place, no doubt, a transition indeed fraught with great results. We begin to see things as they were. Leland and all the busy and intelligent observers of the age have left their records of what they saw, and we can see with them, what Bath really was, of which in fact we only caught occasionally glimpses before. We are able, moreover, to see the beginning of a new public life, the development of citizenship, and the recognition of citizens and their callings by name and designation. We hear especially for the first time in our history of physicians by profession—physicians too in connection with the springs and their healing virtues, whose observations and experience on which they have in their own quaint way, and in the diction of the age, left us as an example of the progress of therapeutic knowledge, and as specimens of quaint and curious medical literature almost unique.

1 It will be seen in the description of which this writer gives of Bath, that although he only mentions Dr. Turner as a writer upon the Bath Waters, he speaks of several physicians who were practising in the city.

HARRISON'S DESCRIPTION OF BATH, 1577-1578.

Before we say anything on the long line of eminent physicians connected with Bath, we give a correct copy of that work. It was published in

Holinshed's Chronicles

About 35 years after Leland published his Itinerary. It appears to us to be a more complete picture of the city than Leland's. In the following century Camden repeats almost in the same language the same superstitious nonsense with regard to the Baths as that indulged in by Harrison,[1] as well as Leland.

"**Harrison's Description of England**, in SHAKSPERE'S YOUTH, Being the Second and Third Booke of his Description of Britaine and England. Edited from the First Two editions of Holinshed's Chronicle, A.D. 1577-1587. By FREDERICK J. FURNIVAL, Founder and Director of the New Shakspere Society, Pt. 1. Second Book, with Extracts from the Autographs of Harrison's Chronologie, and from Foreign Writers on England; and with Norden's Map of London, 1593, and Notes on it by Henry B. Wheatley. Published for the New Shakspere Society.

1 Page 79 and 80.

Bath in Somersetshire (where I, Parson Harrison, have been.)

"The (1) last place of our Baths is a citie in Summersetshire, which taketh his name of the hot waters there to be seene an used. At the first it was called Cair Bladud, and not Cair Bledune, as some would have it, for that is the old name of the ancient castell at Malmesburie, which the Saxons named Yugleburne, Ptolomic afterwards called it *Thomia*, other *Aquæ Solis* [or Seaman nia, or Acmancester,] but now it height generallie Bath in English, and under that name it likelie to continue.

A very ancient city, with carven stones in its walls.

The citie of itself is a verie ancient thing, no doubt, as may yet appeare by diverse notable antiquities ingraved in stone, to be seene, in the wals thereof; and first of all betweene the south gate and the west, and betwixt the west gate and the north.

Sculptured stones in the walls of Bath.

The first is the antike head of a man, made all flat, with great locks of haire, much like the coine that I have seene of Antius the Romane. The second betweene the south and the north gate is an image as I take it, of Hercules, for he held in each hand a serpent, and so dooth this. Thirdly, there standeth a man on foot with a sword in his one hand, and a buckler stretched out in the other. There is also a branch that lieth folded and wreathed into circles, like to the wealth of Alcinrod. There are, moreover two naked images, whereof the one imbraceth the other, beside sundrie antike heads, with ruffled haire, a graiehound running, and at his taile certaine Romane letters, but so defaced that no man living can read them at this present. There is, moreover, the image of Lacaon inuironed, with two serpents, and an other inscription; and all these between the south and west gates, as I have said before. Now, between the west and north gate are two inscriptions, of which some words are evident to be read, the residue are cleane defaced. There is also the image of a naked man, and a stone in like sort, which hath *Cupidmes and labruscas*

One with a Latin inscription now defaced.

Others with inscriptions that can be read.

1 The fourth and.

intercurrentes, and a table hauing at each hand an image ured and finelie flourished both aboue and beneath. Finallie (sauing that I saw afterward the image of a naked man grasping a serpent in each hand) there was an inscription of a toome or buriall, wherein these words did plainlie appeare, Visit annos xxx: but so defusedlie written, that letters stood for whole words, and two or three letters combined into one. Certes, I will not saie whether these were set into the places where they now stand by the gentiles, or brought thither from other ruines of the towne itselfe, and placed afterward in in those wals, in their necessarie reparations. But howsoever the matter standeth, this is to be gathered by our histories, that Bladud (1) first builded that citie there, and peradventure, might also kindle the sulphurous veines, of purpose to burne continuallie (there) in the honour of *Minerua*, by which occasion the springs thereabout did, in process of time become hot and not onprofitable, for sundrie kinds of diseases. Indeed the latter pagans dreamed that *Minerva* was the cheefe goddesse and governesse of these waters, because of the neernesse of hir temple onto the same.

Also an inscription on a tomb.

City of Bath.

Solinus added furthermore, how that in his said temple, the fire which was continuallie kept, did never consume into dead sparkles; but so soone as the embers thereof were cold, then congealed into hard clots of stones. All which I take to be nothing else than the effect of the aforesaid fire of the sulphurous veine kindled in the earth, from whence the waters doo come. That these baths or waters are derived from such, the *marchasites* [which the Grecians call *Pyritis per autonomasiam* (for being smit with the iron, it yieldeth more sparks than anie flint or calcedonie, and therefore seemeth to deserue the name above the rest), and besides these other] stones mixed with some

Chap. 23.

The Pyritisi found almost in enerie veine of mettall in great plentie diuersities and colour, and sometimes mixed with that mettall of whose excrements it consisteth.

1 It will be observed there is no reference to the pigs.

copper, and dailie found upon the moun(1)teins thereabouts will beare sufficient witnesse, though I would write the contrarie. Dr. Turner also, the father of English physicke, and an excellent diune, supposeth that these springs doo draw their forces from sulphur; or if there be anie other thing mingled withall, he gesseth that it should be saltpetre, because he found an obscure likelihood of the same, euen in the Crosse Bath (2). But that they participate with anie allume at all, he could never till his dieng daie be (induced to beleeue). I might here (if I thought it necessarie) intreat of the notable situation of 4 (the citie) which standeth in a pleasant bottome enuironed on every side with great hils, out of the which come so manie springs of pure water by sundrie waies into the citie, and in such abundance, as that eurie house is served with some pipes of lead, the said mettall being the [more] plenteous and lesse of value into them, because it is 'not had' (3) far off from those quarters. It should not be amisse also to speak of the four gates, number of parish churches, bridges, religious houses dissolved, and their founders, if place did serue therefore; but for so much as my purpose is not deale in this behalfe, I will omit the mention of these things, and go in hand with the baths themselues, whereof in [the title of] this chapter chapiters I protested to intreate.

Doctor Turner, the father of English Phy-sick, thinks the Bath waters hold sulphur and salt-petre but not alum.

Bath's very pleasantly situated in a bottom ringd with hills whence streams run

The City of Bath is well supplied with water & has four gates, bridges, &c.

Crosse Bath. This is the biggest and is used for leprosy, scabs, &c.

There are two springs of water (as Leland saith) in the west south west part of the towne whereof the biggest is called the Crosse bath, of a certaine crosse that was erected sometime in the middest thereof. This bath is much frequented by such as are diseased with leaprie, pockes, scabs, and great aches, yet of its selfe, it is very temperate and pleasant, haven eleven(4) or twelve arches of stone, in the sides thereof for men to stand under, when raine doth ought annoie them. The common bath, or, as some call it, the hot bath, less in compasse within

Common Bath. This is the hot

1 Marchasites and
2 Crosse Bath. 3 Had not. 4 A lenen.

the wall than the other, and with sundrie seven arches, wrought out of the manie inclosure. It is worthilie called the hot bath, for at the first coming, into it, men thinke that it would scale their flesh, and lose it from the bone, but after a season and after that the bodies of the commers thereto be warmed throughlie, in the same, it is more tolerable and easie to be borne. But these baths be in the middle of a little street ivined to S. Thomas Hospitall (1), so that it may be thought that Reginald, a Bishop of Bath, made his house neere onto these common baths, onelie to succour such poore people as should resort unto them.

Bath and at first men think it'll scald the flesh off their bones.

[1 St. John must be meant.]

The Kings bath is verie faire and large, standing almost in the middle of the towne, at the west end of the Cathedral Church. It is compassed about with a verie high stone wall, and the brims thereof are mured round about, wherein be two and thirtie arches for men and women to stand in separatlie, who being of the gentre for the most part, doo resort thither indifferentlie, but not in such lasciuious sort as unto other baths and hot houses of the maine whereof some write more a great deale than modestie should reueale and honestie performe. There went a sluce out of this bath, which serued in times past the priorie with water,* which was deriued out of it unto two places, and commonlie used for baths, but now I doo not thinke that they remaine in vsage.

Kings' Bath.

Hot houses in some countries little better than brothels.

As for the colour of the water of all the baths it is most like to a deep blew, and reeketh much after the manner of a seething pot, commonlie yielding somewhat a sulphurous taste, and very unpleasant savor. The water (also) that runneth from the two small baths goeth by a dike (1) into the Auon by west, and beneath the bridge; but the same that goeth from the King's bath turneth a mill (2), and after goeth into the Avon above Bath bridge, where it loseth both force and taste, and is like vnto

Colour of the water of the Baths. Taste of the water.

1 Brodelles. 2 Myt.

*Editor's Note.—This "sluce" is also referred to by Leland.

Fall of, or issue of the water. At noone and midnight the waters boil so hotly that no man may go into them.

the rest. In all the three baths a man maie euidently see how the water bubbleth up from the springs. This is also to be noted, that at certaine times all entrances into them is utterlie prohibited, that is to saie, at high noon and midnight; for at those two seasons, and awhile before and after, they boile verie feruenlie, and become so hot that no man is able to indure their heat or anie while susteine their force and vehement working. They pinge themselves, furthermore, from all such filth as the diseased doo leave in each of them, wherefore we doo forbeare the rash entrance into them at that time; and so much the rather for that we would not by contraction of anie new diseases, depart more greiuouslie affected than we came into the citie, which is a thing in deed that each one should regard these causes (therefore). They are commonlie shut up from half an houre after ten of the clocke in the forenoon, to half an houre after one of the clocke in the afternoone, and likewise at midnight; at which times the keeper of them resorteth to his charge, opening the gates, and leaueth (or should leaue) free passage unto such as come vnto them. Hitherto Leland.

Not good to enter into the Baths at all seasons.

Much money hath been laid out on the Baths in Bath lately.

What cost 'of late hath' (1) been bestowed upon these baths by diuerse of the nobilities gentrie, communittie, and cleargie it lieth not in me to declare, yet, as I heare, they are not onlie very much repared and garnished with sundrie curious peeces of workmanship, partlie touching their commendation, and partlie for the ease and benefit of such as resort vnto them; but also better ordered, clenlier kept, and more friendlie prouision made for such pouertie as dailie repaireth thither. But, notwithstanding all this, such is the general estate of things in Bath, that the rich men maie spend while they will, and the poore beg whilst they list for their maintenance and diet so long as they remaine there; and yet I denie not but that (2) there is very good order in that citie (3)

The rich spend while they will and the poor beg while they please, for their living in Bath.

1 hath of late. 2 yet. 3. there.

for all degrees. But where shall a man find anie equall regard of poore and riche, though God dooth (1) give these his (good) gifts freelie (and) unto both alike! I would here intreat further of the customs vsed in these baths, what number of physicians daillie attend vpon those waters for no man (especially such as be able to enterteine them) dooth enter into these baths before he consult with the physician. Also what diet is to be observed, what particular diseases are healed there, and to what end the commers thither doo drinke of times of that medicinable liquor; but then I should exceed the limits of a description. Wherefore I pass it over to others, hoping that some man yer long will vouchsafe to performe that at large, which, the famous clearke, Dr. Turner, hath brieflie yet happilie begun tonching the effects and working of the same. For hitherto I doo not know of manie that have trauelled in the natures of those baths of our countrie, with anie great commendation; much lesse of anie that hath reuealed them at the full for the benefit of our nation or commoditie of strangers (that resort unto the same).

Lots of physicians attend at the Baths.

I hope some one 'll finish the description of the treatment at Bath that Dr. Turner began.

1 do.

WILLIAM TURNER, D.D., & Physician.

The writer of the *Chronicle* just quoted flourished, as we have said, after Leland, and although he was cotemporary with Turner, the *Chronicle* did not appear until fifteen years after the latter published his treatise on the Waters of Bath. Turner has often been described as a Bath physician.[1] He never practised in Bath; nor indeed did he know even of the existence of the waters until he had ceased to practise physic as a profession and had become Dean of Wells. It must not be assumed that because he entered the Church that he therefore ceased to exercise his earlier art. It is clear that whilst he was attracted to the Church by his strong—almost fanatical—sympathies with the Reformation, he never ceased, during his whole life, amidst the strange vicissitudes and persecutions to which he was exposed after the accession of Mary, to exercise his medical faculty amongst the poor and needy. As a herbalist Turner was pre-eminent in his day, and his great work on the subject is a magnificent example of printing and wood-engraving. *Anthony à Wood* writes of Turner:—

"WILLIAM TURNER, M.D., D.D., Dean of Wells, was born at Morpeth in Northumberland,

1 Turner must have been an early member of the College of Physicians: and there is reason to suppose that, besides Jones, of whom we speak in the next notice, there were other physicians, duly qualified, who practised in Bath, but whose names do not appear. The College of Physicians was established in the reign of Henry VII., Thomas Linacre being the first President, and he, like Turner, took Holy Orders before he died. Linacre was succeeded in the Presidency by John Caius, or Kay, who died in 1573. Now this eminent physician wrote many books which he did publish, but he wrote a work also which he did *not* publish—*De Thermis Britannicis*—in which he gave a prominent place to the Waters of Bath. It is clear, therefore, that Caius, or Kay, must

educated in Cambridge in *trivials*, and afterwards for a time in the study of medicine. This person, who was very conceited of his own worth, hot headed, a busy body, and much addicted to the opinions of Luther, would needs in the height of his study of physic turn theologist, but always refused the usual ceremonies to be observed in order to his being made priest: and whether he had orders conferr'd upon him according to the R. cath. manner, appears not. Sure it is that while he was a young man, he went unsent for, through many parts of the nation, and preached the word of God, not only in towns and villages, but also in cities. In his rambles he settled for a time in Oxon, among several of his countrymen that he found there, purposely for the conversation of men and books, which is one reason I put him here,[1] the other I shall tell you anon. But whether he took a degree in arts or medicine I cannot yet find. At the same time, and after, following his old trade of preaching without a call, he was imprison'd and kept in close durance for a considerable time. At length being let loose, and banished, he travelled into Italy, and at Ferrara he was made a doctor of physic, and was much there in esteem for his faculty, as after his return into England he was among the reformed party. In the latter end of K. Hen. 8, he lived at Collen and other

have known, and most likely practised in, Bath, during some portion of his career. It is probable that his knowledge was acquired during a short residence in Bath after his return from Padua, and before he was appointed physician to Edward VI. Be this as it may, we think we have established a fact not generally known before, that Turner was not the first writer on the Bath Waters.

There is in the Cathedral Library at Wells a rare book by John Chandelare, Chancellaiere Wellensis orationis de laudibus Cairiam fonticulorum curatis. This is a book of the 15th century to which Leland refers in his Itinerary.

1 This W. Turner was a Cambridge man, and Fellow of Pembroke Hall: elect. socius an. 1531. aut circa —*Baker.*

places in Germany, where he published one or more books: and returning to his native country when K. Ed. 6 reigned, had not only the prebendship of Botevant in the Church of York bestowed on him by the archb. of that place, but a canonry of Windsor, and the deanery of Wells by the king. About which time, tho' the day, or month, or scarce the year appears, he was incorporated doctor of physic with us, which is another reason I put him here; for if I could have found the certain time, (which appears not because the register of that king's reign is imperfect) I would have remitted him into the Fasti. About that time he procured a licence to read and preach, as many laymen[1] did that were scholars, practised his faculty among the nobility and gentry, and became physician to Edward duke of Somerset, L. protector of England. After Q. Mary came to the crown he left the nation once more, went into Germany with several English theologists, thence to Rome and afterwards for a time settled in Basil. But when qu. Elizabeth succeeded, he returned and was restored to his deanery, and had other spiritualities, I presume, conferr'd upon him, being then a person had in much esteem for his two faculties, and for the great benefit he did by them, especially in his writings, to the church and commonwealth." The titles of these medical books published under his name are these:—

New Herball, wherein are contained the names of herbs in Greek, Latin, English, Dutch, French, and in the Apothecaries and Herbaries, with the properties, degrees and natural places of the same. Lond. 1551 [Bodl. CC. 58. Art]. and 68, fol.

A Book of the natures and properties, as well of the Baths of England, as of other Baths in Germany and Italy. Collen. 1562, in a thin fol. and in an Engl. char. [Bodl. CC. 58. Art.]

1 He was in deacon's orders at least, nam anno 1536, Mar. 20, titulum obtinet a collegio, tunc socius et A.M., and priest by Ridley, Dec. 21st, 1552.—*Baker.*

Treatise of the Bathe at Bath in England. Printed with the former book.

The rare treasure of English Baths, Lond. 1587, [1633,] qu.

That he was a member of the House of Commons is proved from the following passage in his *Spiritual Physik*, 1555, fol. 44, b. 'But yf they wyll not folowe these gentlemen, but wyll be wylfully blynde and suffer themselves to be led whether so euer it shall please theyr blynde guydes to leade them, they may as well tary at home, as come to the parlament house, to syt there, except they wyll other slepe, or elles tel the cloke whylse learned men dispute the maters that are in contention, as I haue sene some gentlemen of the fyrst head do, when I was a burgesse of late of the lower house.'

Fox speaks of Turner with great respect as 'a man whose authority neither is to be neglected, nor credit to be disputed.'

William Turner married Jane, daughter of George Ander, an alderman of Cambridge, who after the death of her said husband married to Richard Cox, bishop of Ely, and in her second widowhood, did in memory of her first husband, Dr. Turner, leave to Pembroke hall in Cambridge, of which he had been fellow, an annuity of five marks, and some pasture lands in Knapwell. Ric. Parkeri Σκιλλιτος, MS. KENNET.'

No one will dispute the competency of Conard Gesner to pronounce judgment on the merit of the scholars and natural historians of his time; and he, in the preface to his History of Birds, printed in 1555, has said, that before himself, a few, in modern times, had briefly written upon the names and natures of birds, among whom, Gyb. Lengolius, a German, and Willian Turner, an Englishman, were both men of the greatest learning, and deserving of

the highest praise. Also in his book *De Herbis Lunariis*, he says, "about 15 years since, Turner, an Englishman, returning out of Italy, paid me a visit: and I found him a man of such excellent learning, both in medicine and most other sciences, that I can scarcely mention such another." Harrison, too, under Bath, in his Description of England, calls him "Doctor Turner, the father of English Physicke," and in another place, "The famous clerk, doctor Turner." "Turner," says Dr. Merret, in his Pinox, "was the most indefatigable man of his age, and published a book on birds, little in size, but great in value;" and Pultney, in his Progress of Botany in England, confers this remarkable eulogy upon him—"The True Æra of botany in England must commence with Dr. William Turner, who was unquestionably the earliest writer among us that discovered learning and critical judgement in the knowledge of plants; and whose 'Book of Herbs,' as Dr. Bulleyn observes, 'will always grow green, and never wither as long as Dioscorides is held in mind by us mortal wights.'"[1]

1 The famous Dr. Bulleyn was grandfather of Queen Anne Boleyn and great grandfather of Queen Elizabeth.

"Treatise of the rare Treasure of English Bathes set forth for the benefit of the poore sort of people, who are not able to go to the poorer sort of physitian, by William Bremer, practitioner in physick and chirugian, was inserted in the Englishman's Treasurer with Vicary's Anatomy. London, 1633, 4to., part v. p. 79-95."—*Johnson.*

TITLE of the genuine and complete edition of Turner's Book:—

A Booke of the natures and

properties, as well of the bathes in England as of other bathes in Germanye and Italye, very necessarye for all syke persones that can not be healed without the helpe of natural bathes, lately oversene and enlarged by William Turner Doctor in Physick.

God saue the Quene.

Imprinted at Collen by Arnold Birckman, in the yeare of our Lorde M.D. LXVIII.

Cum Gratia & Priuilegio Reg. Maiest.

Then, after a very characteristic preface, the author gives a long list of "the learned men which write that the bathes have the vertues and properties which hereafter in this boke I give onto them."

IOHN IONES, Physician.

JOHN JONES, a Welshman, born, or at least of Welsh extract, was educated in both the Universities, especially in that of Cambridge, where, as I conceive, he was graduated, that is, took one degree in physic, and became eminent in the practice of it, sometimes at Bath, and sometimes in Nottinghamshire and Derbyshire. He wrote:—

¶ THE BATHES OF
Bathes Ayde.
Wonderfull and most excellent,
aganyst very many Sicknesses, approued
by authoritie, confirmed by reason, and
dayly tryed by experience: vvith the
antiquitie, commoditie, propertie,
knowledge, vse, aphorismes, diet,
medicine, and other thinges
therto be considered and
obserued.

Compendiously compiled by
Iohn Iones Phisition.

ANNO SALVTIS. 1572.

At Asple Hall besydes
Nottingham.

Printed at London for vvilliam
Iones; and are to be Solde at his
new long Shop at the west
dore of Pauls Church.
13. Maij.

TO THE RIGHT HONO

rable, Henry Earle of Pembroke, Lord Herbert of Kayderdid, &c.

DEMOCRITVS the most auncient Philsopher of Abdera, Reader to the Prince of Phisicyons Hippocrates, (right honorable Earle) most learnedly in his Epistle De naturabumana, to the same Hippocrates, recounteth hovv necessary it is for all men to knovv the arte of Phisike: bicause it is not onelie an vnderstanding most honorable and profitable to lyfe, but also for that of all other it most manifestly setteth forth to the sences, the vvisedome, povver prouidence, and vnmeasurable bountie of our almightie creatour of vvhich to be ignorant it is greate impietie, as Galen testifieth in his thyrd booke De usu partium.

Hieronymus Montuus therefore in his epistle to Anasceue morborum, dedicated to Henry the last French Kinge to whom hee was not onely cheefe Phisicion, but also one of his priuie counsaill, affirmeth that of all sortes, Phisike is to bee embraced, and of them cheefely which are endued with honorable dignities, and waightie affaires of the commonwealth. For, as wysedome (sister to Phisicke) dooth deliuer the mynde from euill affectes, and maketh vs to liue for euer in perpetuall ioye with aungelles: So Phisike maintayneth health, and expelleth sicknesses from the body, makinge us liue a longe and lustie lyfe, as Galen in his workes De sanitate tuenda, most reasonablie teacheth.

Furthermore, vnderstanding, Science, and al actiuities, by health are increased, as by sicknesse the contrary of necessitie ensueth, whereof my (good Lord) it behoueth all men too haue a due consideration, which be louers of vertue and honestie, and for their sakes loue things that be best. For when the state ot the body is sicklie affected the partes not doinge their offices, the mynd it self although it be a particle diuine hath no chearfulnes pleasure or delight in the meditacion of vertue eyther devuine or morall. Seeing that sicknesse darkeneth the mynde, dulleth the sences, and depriueth, deminisheth, or deprayeth the partes accidetaly of their operations.

VVherefore (noble and prudent Earle) not sparing any paine, nor fearing the reproachefull wordes of the enuiouse Momus, and his capcious rable, setting aparte all colours of Rhetorique for the auoyding of prolisitie, and bicause, Verriitatvs oratio simplex, I haue published an Ayde, most profitable for all them that neede it, and that suche an ayde, as god hath blessed our contrie with, cõparable to any elswher, if in euery respect thoroughly it bee considered. Seeing that amonge all the most maruaylouse workes of nature, there is none more wonderfull, none more excellent, none more auayleable to the helpe of the disseased, and ammendmente of the enfeebled partes of man, then the Bathes naturall of the Cittie of Bath, if they be rightly used, orderly observed, and as need requireth, frequented (the efficient cause of this oure enterprise) as here in may appeare, as well by the authoritie of the most sage Philosophers, most renowned Phisicyons, and most auncient Historiographers, as by reason it selfe approved by arte, confirmed by use, and dayly tried there by practice for these 2460 yeares, or therabout.

And for that the founder Blaydin Doyeth, or Bladud the wyse and eloquent Philospher XI. yeares student, in Athenes, a Brittayn the IX. King of this monarch after Brute, was the firste that uttered the vertue of the water, and that erected the cittie (whose genealogie we have rightly ascended to Adam and may lineally be descended to your Honour, and many other of the race, of the most worthie nobles of this lande, howsoever the injuries of tymes have altered and obscured the same. So likewyse of dutie to your Honour erde of the same graine. I dedicate these my willinge labours of the South Bathes of England, entytuled Bathes Ayde, cotaying fower bookes in one volume (as I have my treatise of the North Bathes, to the noble and puissant Earle of Salope). The first of these bookes probablie proveth, the discent of Bladud, antiquitie of the Brittaines, the certaintie of the monuments, the sicknesses the bathes helpe, the accidents they take away, wherof they proceede, &c. The second sheweth the diversitie of opinions concerning the cause of these and such lyke waters, how and wherein the Phisicions and Philosopers resulte, what minerals bee in them, of what qualities they be, by which they worke their effectes. The thyrd expresseth thinges naturall, not naturall, thinges annxed to nature, and things against nature, withall the signes shewers of the state of the sicke and whole, through the which the better consultacion may be had, not only whether these bathes will helpe or not, but also the chyrurgians, students in Physicke, and al other capable of reason, may fynde a most apte trade of understanding comprehended in few words, &c. The fourth and last declareth Aporismes, and brief rules how, in, and at the Bathes, they shall use themselves, what meates, what drinkes, what cordiall conforta-

tiues, with most excellent purgations, clisters, suppositoures, &c., meete for every complection, and purging humoures abounding, with all other remedies, against such accidentes as growe by reason of hote bathes, and to what infirmitie every of the bathes serve beste seuerally, &c. Hoping that your Honour, of your noble nature will accept in good parte my willing endevoure, although in desarte it be farre unworthy the credite or preferment, that Authonius yeelded to Apianus, for his booke, written of the properties of Fishes: or that Adrianus did to Arianus for his booke of the Gestes of Alexander: or that Alexander Magnus did to Aristot, for his worke, De animalibus. Howbeit in desire to profyte the universall people of God, I truste nothing inferiour, assuring your Honour, as tyme and leysure will permit, to present your Noble bountie with greater workes hereafter, for that your honorable disposition euidently appeareth as well most readie towardes the furtherance of all vertuous attemptes as the aduauncement of the common commoditie of your Countrey: wherein you plainly expresse a perfit effect of very Nobilitie; the continuance whereof (as I nothing doubt) so I humbly beseech the Almighty to endue your good Lordship, and the right honourable Lady Anne, your noble and moste vertuouse vvife, with Galens health, Nestors yeares, Crœsus welth, and Augustus hapines.

Your Lordships alwayes,

Iohn Iones.

It is a curious characteristic of the times in relation to men of letters, not only that they sought eminent and powerful patrons—this was almost natural when so many obstacles presented them-

selves, to overcome which only the aid of the great, the affluent, and the generous could suffice—but that they sought and used the co-operation of fellow-workers in their art and calling. Jones understood his business, and the testimony to character and competency from his friends Churchyarde and Lupton is especially interesting :—

THOMAS CHURCHYARDE

TO THE READER.

If still my pen in silence slept, when wit the world awakes,
And willing mynds with weary workes, great toyle & travel takes :
My frendes might think I had forgot to honour learned men,
And dulled spirites did daintie ware through pivish slouth of pen.
Wherfore though simple sight I have in bathes and boiling springs,
I prayse the head that here vnfould, the sorce of secrete things
Though sundry sercht by judgements deepe, to hit the mark before
At rouers they but shot theyr shafts, and dribbed wyde a share.
For Bathes did breede an heape of doubts, and few disclosed the same,
Till he that wrote this skilfull booke, a forme thereof did frame,
And tells vs howe, and when we ovght, to vse the bathes a right,
Which frutes who skornes to know and keepe, is blind of sence and sight.
And seeking help he findeth harme, yea sometimes death withal,
So doth the young babe that warmes his hand and so in fire fall.
Or as a chyld in sommer tyme seeking his thyrst to coole,
Doth slip onwares down cruel streams, and drowns him self in poole.
As men that seeke for medicine sweete, may sometimes myschef finde,
If they obserue not seasons due, take eche thing in kinde,
I wode no further in this case, read what doth follow heere,
And robbe no spark of fame from him, that makes these douts so cleere
Who thinks this labour well bestowed if thou thereby mayst gaine,
Or if in busie babling world, his works may skape disdaine.

Churchyard was born in Shrewsbury about 1520, and was attached to the household of the Earl of Surrey. He was a soldier and met with many curious adventures, of which he gives an account in the first part of "Churchyard's Chippes." He also appears to have been acquainted with Jones and Bath ; at any rate there is no doubt that he desired

to do a little bit of puffing to Jones's work, and it must be granted that it was clever puffery.

Wood (p. 200 v. 1) quotes the following lines of Lupton :—

> How many use to Bathes abrode
> For hence with cost to range,
> Whereby they may their lothsoms Lims
> To helthful members change.

But Lupton wrote besides this some lines laudatory of Jones's work, which we also quote. Lupton, it may be observed, was very little known as a poet, but he appears to have been personally acquainted both with Jones and with Bath. Lupton was the author of a play entitled "All for Money," but little more is known about him.

THOMAS LUPTON

TO THE READER.

If such are worthy of reproach that never cease to toyle,
For private gayne, their country men thereby to hurt or spoyle,
Then they deserve great prayse and fame, whose study watch and payn
No profet them they neuer knew, wyth dayly welth and gayne,
And if the greater common good, the greater prayse doth craue,
Then they that publeck welth procures, deserues the more to have.
For though wyth many worldly welth, is chiefly now preferd,
Yet syck and lame and yrcksome soore do health much more regard.
For who, though he have Cresus welth, in sickness can be glad,
Wher health is not, though welth be there, what joy can ther be had.
Yet doth the poore and healthfull wretch oftymes reioyse we see,
But if that sicknes dwell with welth, then myrth from thens doth flee.
If this be trew, then Jones deserues both double prayse and fame,
That tooke such payns for commonhelth, this Ayde of Baths to frame.

An extract will indicate the elementary nature of Jones's treatise, and how little was understood of the nature and properties of the waters :—

"Naturall bathes be those which flow thorow the bowels of the earth, taking theyr effectes, of the

vertue, of such things, as they runne by, and receue power of, for many infirmities most auaylable.

"Of these, some be feruent hot, some luke warme, some betwene both, some not at all, some of brimstone, some of allume, some of salt, some of copper, some of iron, some of lyme, some of leade, some of gould, some of silver, some of one kinde of commiction of myneralles, some of another, and sundry of these are found with us."

Then follows a very learned discourse on ancient names and their derivations, more amusing than edifying, Wales having more than her proportion of praise and honour, as might be expected.

"But because our entent is, especyall to entreate of the bathes, of the citie of Bathe, in y countie of Somerset. Albeit we wyll briefly touch Buckstone, sainat Wincents' Hallywell. Fyrstt edifyed by Bladud, calling it after his owne name, Kayer Blaidin, and after Kayer Bathe, as Matheus Westmonasterientis thewith agreeing to our fyrst natiue tongue. Brittysh, now improprely called Welsh, for Kayer signifyeth fortres or walled citie, as is easye to be gathered by the monuments themselves in all partes of this lande, of which for the better testimonie, we shall recyte one or two (omitting five hundred) as they come fyrst, to our remembrance, beginning at the uttermost cōfyne, in the borders of Scotland: although then, and long after, it was one monarche, and tongue; Kayer Leil, the which as yet hath not lost the name, of his founder Leil, as if you would say Leil's[1] sorte."

1 Leil, according to Geoffrey of Monmouth, was contemporary with King Solomon! and is sheer mythological and learned nonsense.

DR. REUBEN SHERWOOD.

Guidott says:—"Of Doctor Reuben Sherwood, the first physician I met with any remembrance of, I can give no other account than that he died here Anno. Dom. 1598." Doctor Reuben Sherwood was born in Bath, and, although little is known of him except that he was a good citizen, was the father of Dr. John Sherwood, and was of the Romish faith, as was his son.

DR. THOMAS ELTON.

Doctor Thomas Elton, "'tis likely, was contemporary with Dr. Sherwood, or not long after, whom he survived twenty years, and was buried at Bath, August 11th, 1618; a well-bred gentleman, obliging and affable." We can find no other account of him. He was of local origin, and most probably educated here, inasmuch as he is not on the roll of either university.

DR. JOHN SHERWOOD.

"At the same time also flourished Dr. John Sherwood, graduated in the University of Cambridge, who died two years after Dr. Elton, and was buried in the Church of St. Peter and Paul, in the South-isle, as appears by this indifferent poetry on a piece of brass against the wall; in which he is recommended to posterity with this bare title:

Joannes Sherwood, Doctor Med., Sepultus, 16 Feb. 1620 :—

Conditur hic Sherwood, medicâ praclarus in arte
Doctor, adhuc cujus sama corusca volat :
Offa licet lateant hujus sub mole sepulchri
Spiritus æltherea vivit in arce poli.

Which may thus be answerably translated :—

Here famous Doctor Sherwood lies,
Whose skill in physick lore
Was great, and his bright fame yet flies,
Both now and evermore.
Although within this tomb his bones
Are hidden out of sight,
His soul, not pent within these stones
To Heav'n hath ta'en her flight."

Now, although the worthy doctor was, like his father, of the Romish faith, he was without bigotry, and the fact of his being buried in the Abbey simply implies that, dying in the parish of St. Peter and St. Paul, he could not be buried elsewhere. There is another fact, however, to be noticed, namely, that Dr. John Sherwood occupied the Abbey House, in which he received wealthy and illustrious patients until his death. We are aware that it is generally supposed that Peirce first appropriated that historic house as a receptacle for patients, but it is not so. Who succeeded Sherwood between 1620, when he died, and the period when Peirce entered upon it in 1653, we have not been able to discover. Guidott does not help us, nor did he seem to be aware of the connection of Sherwood with that famous house.

If our readers will refer to the small Woodbury-type illustration they will perceive a narrow flight of steps which was constructed by Dr. John Sherwood for the private accommodation of the patients visiting his house who used the King's Bath. Queen Anne, during her visit to Bath, occupied the Abbey House,

and was Sherwood's patient. The slip at the north-east corner of the bath was called "the Queen's slip," after that visit in 1615; and three years later, as Wood tells us, "a house was rebuilt and enlarged on the west side of the 'Queen's Bath' for the private use of such as should bathe in that cistern, in the battlements of which house the letters of the inscription on the cross in the middle of the bath supplied the place of ballusters or the ornaments of the dado," the date 1618 being part of the inscription. This house was thus used for 120 years. This is the whole history and mystery of Mr. Davis's drawing on which he has based his work, "The Bathes of Bathes Ayde." The figures of various persons in various costumes at the several windows were, no doubt, watching the bathers who were tumbling about in the waters below.

'Twas a glorious sight to behold the fair sex
All wading with gentlemen, up to their necks,
And view them so prettily tumble and sprawl
In a big smoking kettle as big as our hall.

DR. EDWARD JORDEN.

"Concerning Dr. Jorden, whose name is yet fresh, and memory very acceptable to all that knew him, having left the deserved reputation of a learned, candid, and sober physician: I have written something heretofore, and shall only here again mention some particulars more nearly relating to his person and condition. Doctor Jorden, I understand, was a gentleman of good family, and being a younger brother, designed for a profession; for which when he had accomplish'd himself by a convenient course of studies in his own country, he travelled abroad to see the manners and customs of the Universities

beyond sea; and having spent some time there, especially at Padua, where he took the degree of doctor in physick, returned home, practised at London, became an eminently solid and rational philsopher and physician, and one of that famous and learned society, the King's College of Physicians, there.

"He had a natural inclination to mineral works, and was at great charges about the ordering of alom, which succeeding not according to expectation, he was thereby much prejudic'd in his estate, as appears from these words in the seventh chapter of his 'Treatise of Nat. Bathes and Mineral Waters:' 'Now I come to Alom (indignum vox ipsa jubet renovare dolorem!) the greatest doctor I have, and I the greatest benefactor to it, as shall appear, when I think fit to publish the artifice thereof.' For the patent or grant for the profit of the Alom-works, which he reasonably did expect, fell afterwards, I know not how, to Sir Arthur Ingram's lot, although the doctor also had a good share in the affection of King James."—*Guidott.*

Jorden was the most popular man of his day in Bath, whether in or out of his profession. Of noble mien, gracious manners, and great mental accomplishments, he exercised much influence and won all hearts. His virtues were as conspicuous as his benevolence was real and unaffected. Even Guidott praises him without stint. There is no doubt that Jorden was one of those men whose well-balanced qualities are irresistible. As Guidott says of him:—"After he had practised some time in London, he settled at Bath, where living many years, and having children, not a few, his conversation was so sweet, his carriage so obliging, and his life so answerable

to the port and dignity of the faculty he profess'd, that he had the applause of the learned, the respect of the rich, the prayers of the poor, and the love of all."

A story is told of him that when abroad he defended the Protestant faith against the attacks of some Jesuits, who conceived a scheme to murder him, but being privily informed of their design, he withdrew from the place and thus defeated their purpose. When Queen Anne (of Denmark) visited Bath, as we have seen, she was nominally under the care of Dr. John Sherwood, at the Abbey House, but she was especially committed to the charge of Jorden, under whose directions she bathed and used the waters. The King, to requite him for these and other services, granted him the profits derivable from his allum works, but soon after revoked it. The story of his marriage is romantic. Having lost his way on Salisbury Plain he was directed by a shepherd to a gentleman's house at some distance. This gentleman's name was Jordan, who had an only daughter whom Jorden married; she thus by transforming the a into an e became Mrs. Jorden instead of Miss Jordan. He wrote:—

A brief Discourse of a Disease called the Suffocation of the Mother, written upon occasion which hath of late taken thereby, to suspect possession of an evil Spirit, or some such like supernaturall Power. Wherein is declared that divers strange Actions and Passions of the Body of Man, which in the common Opinion, are imputed to the Devil, have their true naturall Causes and do accompany this Disease.[1]

1 Dr. Meric Casaubon, in his preface to "A true and faithful Relation of what passed for many years, between Dr. John Dee and some Spirits: London: 1659 (Sign. C. 3)," says that the book, in his time, was so rare that many booksellers doubted its existence. It is now seldom or never seen except in the public libraries.

Jorden was induced to write this work in consequence of the following incident in his professional experience :—

"Whilst he practised in London there was one Anne Gunter troubled with such strange and unusual symptomes, that she was generally thought and reported by all that saw her to be bewitch'd. King James, hearing of it, sent for her to London, and pretending great pity to her, told her he would take a great care for her relief, in which thing he employed Dr. Jorden, who, upon examination, reported to the King that he thought it was a cheat; and tincturing all she took with harmless things, made her believe that she had taken physick, by the use of which, she said, she had found great benefit. The doctor, acquainting his Majesty that he had given her nothing of a medicinal nature, but only what did so appear to the maid, and also, that though when he repeated the Lord's Prayer and Creed in English, she was much out of order, yet at the rehearsal of the same in Latin she was not concern'd, the King was confirmed in what he had suspected before, and the doctor had suggested. Whereupon the King dealing very plainly with her, and commanding her to discover the truth unto him, the maid, though at first very unwilling to disclose the juggle, yet upon the King's importunity and promise to her of making up what damage should accrue from the discovery, confessed all, and his Majesty received from her own mouth this account :—'That sometime before, there happened a difference between a female neighbour of her father's and himself, and having in his own apprehension no better way to be avenged of her than this, impiously caused his daughter, on the receiving of the sacrament, to engage to imitate one bewitched, and ascribe it to that woman, which she did, and acted this part in so exact and wonderfull a manner, that she deceived all the country where she lived, who thought it to be a truth. After which confession she was very quiet, and the King giving her a portion, she was afterwards married, being, by this subtle artifice, perfectly cured of her mimical witchery.'"

The first edition of Jorden on the Bath Waters was published in 1631. Guidott says that a second edition was published the same year, but we think there is an error here. In 1676 an edition was published by Guidott, to which an appendix is added,—

A Treatise concerning the Bath, wherein the Antiquity both of the Baths and the City is discussed," &c.

DR. TOBIE VENNER.

Tobie Venner was born at Petherton, near Bridgwater, in Somersetshire, became a commoner of S. Alban's Hall in 1594, aged 17 years, took one degree in arts, studied medicine, practised in his native town for some time, afterwards at Bridgwater, 1624, and lastly in the city of Bath and "near thereunto." In 1613 he took both the degrees in medicine, had then, and always after, the name of a plain and charitable physician, was resorted to by rich and poor, and venerated by all persons for his happy and successful practice in his faculty. "He did not only shew the right way for living long; but acted it himself, confirming the theory of the one with the practice of the other for near 60 years."—*Anthony ā Wood.*

He wrote and published the following:—

Via recta ad Vitam longam: or, a Treatise wherein the right way and best manner of living for attaining to a long and healthful life is clearly demonstrated. Lond. 1620. [*Bodl.* 4to. W. 2 Med., second edition 4to. Lond. 1622. *Bodl.* Gough, Somerset, 6.] 1650, &c., in qu. This plain book, which was "written in condescension to mean capacities," got him most of his practice.

Compendious Treatise concerning the Nature, Use and Efficacy of the Bathes at Bath.

Advertisement concerning the taking of Physic in the Spring.

Censure concerning the Water of S. Vincent's Rocks, near Bristol.

Brief and accurate Treatise concerning the Taking of the Fume of Tobacco. These four last were printed with *Via Recta.*

Philosophical Discourse of dieterical observations for the preserving of Health.

Venner, it must be admitted, wrote a good deal of twaddle, but so did most of his contemporaries. The difference, however, is that many of them wrote much that was clear, vigorous and able. Venner's treatise on tobacco, by its clear good sense and comprehensive grasp of the subject, went far to redeem his reputation from the contemptuous disparagement of Guidott. Venner was the friend of Peirce, Guidott's successful and most formidable rival, and the fact in itself was quite sufficient to account for Guidott's hostility to Venner, of whom he says, whilst pretending that he was quoting another, "that some men had guts in their brains, but Venner's brains were in his guts." Peirce wrote an epitaph on his friend, and in order to ignore Peirce, Guidott quotes the epitaph and says the "author of it is uncertain," although the fact admitted of no doubt whatever. After a tirade of abuse, Guidott ends his notice as follows:—

"I wrote not this to derogate from Dr. Venner, or disparage the epitaph, having that esteem for both they do deserve; but as the devil, we say, should have his due, so, I think, 'tis not fitting a saint should have more."

Anthony ā Wood says:—

"He died at Bath on the 27th day of March, 1660, and was buried in the south isle joyning to the great church there dedicated to S. Peter. Over his grave was soon after put a very fair monument, with the bust of the defunct, in the east wall, with a large inscription thereon, made by Dr. Rob Peirce, a physician of Bath, sometimes a com. of Linc. College; a copy of which, with most curious notes on it, you may see in a book entit. *A Discourse of Bath, &c.*, printed 1676, in oct., p. 170, 171. Written by a physician of note in that city."

DR. JOHN MAPLET.

John Maplet, son of a father of both his names, a shoemaker, was born in the parish of S. Martins le Grand, in London, educated in the college school at Westminster, elected thence a student of Christ Church in 1630, took the degrees in arts, and then took Holy Orders, entered upon the study of medicine, was afterwards one of the Proctors of the University; and being made Doctor of Physic in 1647 (about which time he had the grant of the principality of Gloucester Hall conferred on him), he went into France in that or the year following with his pupil, Lucius, the young Lord Falkland, where continuing about two years, mostly at Orleans, Blois, and Saumur, he made many observations on those and other places, which he committed to writing in a neat and curious hand, with a particular tract of his travels, in an elegant Latin style, which is promised by one of his faculty to be made public.[1] Afterwards he made another journey beyond the seas with Henry, Lord Falkland (brother to Lucius, who died in France),[2] travelled into Holland and the Low Countries, and made other observations, which he committed to writing. Upon his return thence he practised his faculty in the summer time at Bath, and in the winter time at Bristol, with great respect and veneration from all people in those parts, and in 1660, he was restored

1 This refers to Guidott, who, as will be seen in the list of Maplet's works, fulfilled his promise in 1694.

2 These were sons of the Lord Falkland who fell at the battle of Newbury.

to his principality of Gloc. Hall (from which he had been ejected), and soon after resigned it.

Maplet lived a studious and sedentary life, the tendency of which developed the constitutional delicacy to which he was liable. He died from an attack of gout, greatly aggravated by other disorders, in 1632, aged 63, and, as Guidott says, "leaving behind him the name of a judicious, honest and sober physitian, and the excellent example of a pious Christian." We append a list of his works, some of which are very scarce :—

Familiar Epistles from 1650 *to* 1666. They are written in Latin, chiefly to Dr. Jo. Wall, Canon of Ch. Ch. in Oxon.

Medicinal Opinions concerning the Effects of the Baths of Bath. Of these some were published by Dr. Tho. Guidot with this title: "*Epistolarum Medicarum, Specimen de Thermarum Bathoniensium Effectis ad clariss, Medicos D. Bate Fraser, Wedderbourne, &c.* London, 1694, qu. [Bodl., c. 2, 28 line.]

Consultations with Dr. Edm. Meara, Dr. Sam Bave, and others. Cosmetics.

Poems and Epitaphs on several occasions and Persons.

Treatise of his Travels into the Low Countries and France.

This and the rest are all written in Latin, but we think not published. He died on the 4th day of August in 1670, aged 55 years, and was buried in the north cross-aisle, joining to the Church of S. Peter and S. Paul, in the city of Bath. Over his grave was soon after a comely monument set up against the east wall of that aisle, with an inscription thereon, wherein this character is given of him, that he was "Animi corporisque bonis præditus, eruditione, modestiâ et comitate paucis secundus, Artium et Scientiarum omnium panoplia instructus, &c." His style was terse, his words choice, but his periods a little too elaborate. He was learned, candid, and ingenuous, a good physician, a better Christian, and an excellent Latin poet.

DR. BAVE.

[We have used Guidott's memoir, with a slight omission, adding to it such elucidatory notes as may be necessary.]

With Dr. Bave[1] I had the happiness to have a particular acquaintance, being the eldest physician on the place at my coming hither, in the year 1667, and although many things are observable in his life and practice, having lived to see completed fourscore years, yet I shall contract myself as much as may be, in regard I would not be tedious in a thing that ought to be brief.

Doctor Bave was born in the remarkable[2] year 1588, at Colen, in Germany, of a good family, as appears by a good coat of arms[3] bought thence, whence he came young for England on occasion (as he told me) of his being tutor to Sir Thomas Edmonds' son,[4] which Sir Thomas was Ambassador from King James at Paris, where Mr. Bave was then a student; in which family, and about the Court, he

1 The name was at first pronounced Baveé, or Bavey.

2 Doctor Bave, born 1588, "remarkable" for the defeat of the Spanish Armada.

3 At Colen (Cologne). Wood in his Fasti (Ed. Bliss I. 442, date 1628), says he was son of Franc Bave, and had a brother John, settled in London as a merchant. "Good coat of arms." These arms were Or., a rose gules, on a chief azure a lion passant argent.

4 It is not known to us in which year or years Sir Thomas Edmonds filled the important office of Ambassador to the Court of France, but young Bave matriculated at the University of Oxford from Christ Church, 16th December, 1620, in the 30th year of his age. According to this he was born a year or so later than 1588. Young Edmonds matriculated the same day, aged 15. So it would seem as if Bave continued his charge of the Ambassador's son, keeping residence at Oxford at the same time as his pupil, whom he accompanied to England from France. It

continued some time with an honourable allowance from the Knight, but chiefly bent his studies to the faculty of physick, in order to which, he afterwards became a member of that great body and famous Society of Christ Church College in Oxford, where he proceeded doctor in physick in the year 1628, with three other physicians that went out with him, viz., Dr. Taylor and Dr. Speed of St. John's, and Dr. Saunders of Oriel, at a very splendid Act.

The first beginning of his publick practice was at Gloucester, being invited hither by one Whittington,[1] an apothecary, where through his condition could not be expected to be extraordinary, having no natural but acquired friends in England, yet in time he made his own fortunes, and so well improved his small talent at first, as to leave behind him, besides what he parted with in his life time, which was not inconsiderable, the best estate of any physician that died in Bath. And I have often heard him bless God for that good success he had given his undertakings, and the prosperous condition he had brought him to. . . . . .

seems highly probable that he had taken a degree in medicine in Paris before he came to England, because he received an admission to practice at Oxford (see Wood's Fasti, Bliss's edit., I. 398) in 1621; in other words, a few months after his matriculation, without being admitted to any degree in medicine there. He proceeded to his doctor's degree in 1628. As his pupil would probably not remain so long as seven years before taking his bachelor's degree, Bave must have gone down for a time and returned in 1628 to get his doctor's degree conferred upon him. This idea would seem to receive some confirmation by his witnessing a dying man's will at St. Briavels in 1625.

1 The name of Samuel Bave is found as one of the witnesses attesting the signature of William Whittington, of St. Briavels, Gent., to his will made the eleventh of July, 1625. As to his estate at death, besides a house in Bath, he had the manor of Tickenham, Somerset, and a county residence at Highfield, in the parish of Bitton.

After he had been some time in Gloucester, his parts and learning procured the good opinion of Alderman Robinson, a wealthy citizen, and Counsellor at law, whose daughter he married, with whom he lived many years, and had sons and daughters.[1] From Gloucester he removed to Bath, about the year 1640,[2] where practising with admirable success for near thirty years, and maintaining a mighty riding practice, died in a good old age, in his eightieth year, as may further appear by this epitaph I caused to be engraven in marble on a handsome monument erected by his wife, Mrs. Hester Bave, in the south isle of the Abbey Church.

---

1 The name of Dr. Bave's wife was Hester, or Esther, Robinson, of Gloucester, by whom he had issue five sons and three daughters. The eldest of the sons bore his father's Christian name, Samuel. (For further account of the family see Memoranda of Kelston, by Rev. F. J. Poynton, part iv., pp. 82—95.)

Among the members of the family who practised in medicine (not to mention Francis Bave, the Apothecary, of Bath) were Dr. Charles Bave, M.D., of Bath, who died 1733, and Anthony Bave, of Wotton-under-Edge, M.B., whose will was proved in 1738.

Dr. Samuel Bave lived in Bell Tree Lane, in a house which stood on the site of the eastern portion of the Royal U. Hospital, and Dr. Charles Bave in the house known now as 13, Abbey Churchyard.

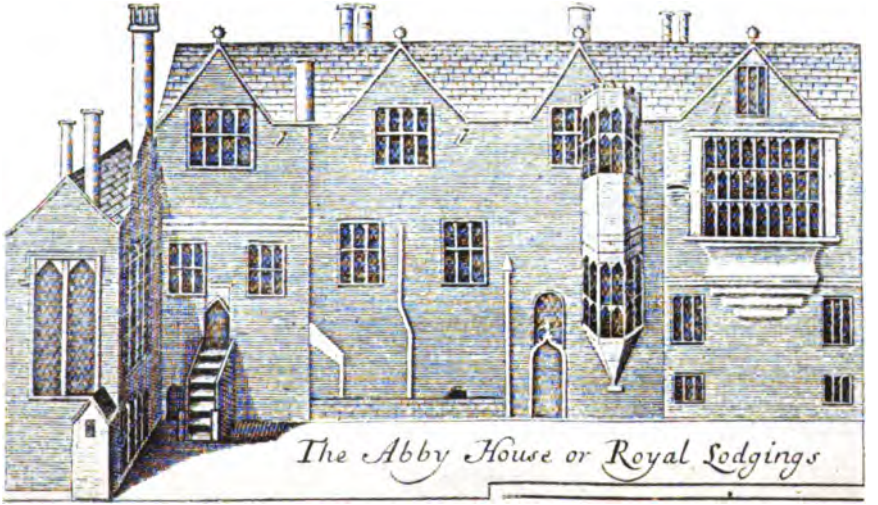
2 "Removed to Bath about 1640." No baptism of any child of his is to be found at Bath, so it would seem they were all born at Gloucester. "Practised with admirable success," so says Dr. Guidott.

As Doctor's opinions proverbially differ, so it would seem do men's opinions of doctors. For it has thus been written of Dr. Samuel Bave's skill by T. W., in his "Songs and Poems of Love and Drollery," 1654, p. 37 :—

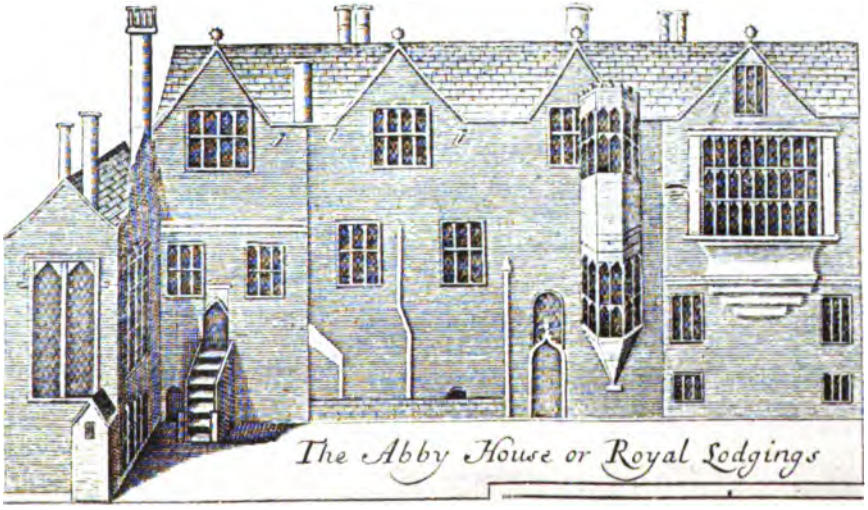
"A Letany upon occasion for journey to Bath.

Second Stanza.

"From an old German yclipp'd Doctor Bavie,
Whose skill is not half so much as his knav'ry,
And ten to one will rather kill 'ee than save 'ee,
Good Mercury defend me."



THE PRIORY OR ABBEY HOUSE.



THE PRIORY OR ABBEY HOUSE.

words, he seems to have been pretty well qualified to deal in his maturer years with all the ills that human flesh is heir to, by having endured them in his own person, "I had at ten years of age a dropsie, an ascites and anasarcha together, (of which I was with much difficulty recovered, by the advice of Dr. Ralph Bayly,[1] of this city, a New College man, whose then wife was a relation of my wife, a Hungerford). At twelve years old I had the small pox, which did not (as was hoped it would) mend my sickly constitution. (Would it not have been remarkable if it had?) At fourteen (being then at school at Winchester), I had a severe tertian ague, which held me six or seven weeks; many accidental illnesses; between whiles I was seldom or never free from a headache, which sometimes would be so violent as to enforce me to give up all business for a time. Besides, I had very frequent defluctions of rheumes, to my teeth and jaws, to the pallate of my mouth, and glandules of my throat, even to the hazard sometimes of a suffocation. At one and twenty, breeding the measles, I bled so excessively at the nose, for two days together, or longer, that some despair'd of my life, my blood was so exceeding thin and sharp, as well as in a great ferment, upon breeding that disease. At this rate I rubbed on, till thirty, when living Westward, near the moors and mashy country, I was seized with an epidemick feaver (a disease usual in those parts about the end of summer) which upon my ventring too soon abroad (to visit a good

1 A well known physician of Bath, whose second wife was a Hungerford. He was a skilful physician, a profound judge of wine, an epicure, a lover of sport, and despised not the fruits thereof, especially when a haunch of venison smoked before him. He came to Bath about 1630, and dying in 1645 was buried in Widcombe Old Churchyard. He left one son by his second marriage, who was also a physician, and practised at Newbury.

friend, as well as a beneficial patient) determined in a quartan ague (a common distemper in that country, and lasting seldom less then six months, sometime twelve or eighteen; nay I have known some in those parts to have kept it two or three years). It is a scandalous thing in that country for a physician to be sick, much more a reproach is it to the whole faculty for him to die. The scandal I could not avoid, the reproach I kept free from, for I was recovered of it in three months, without Jesuit's powder (scarce known at least in those parts then) or any other fam'd febrifuge, only with a plain alternative and aperitive course (sedulously follow'd, and for five or six weeks continued) in which a preparation of steel and Aaron rootes prepared, had a considerable share. In the midst of this course, nature offering a discharge, by swelling the hemoroid veins, I caused leeches to be applyed, and bleed plentifully, from which time I apparently got ground of my adversary, every day. This quartane (though so soon removed and the preceeding feaver, together with the ill steams of that marshy country, left many scorbutical symptomes upon me; for which resolving not to trust a crazy carkass to that rotten country another autumn), I removed hither, not only because it was near my native air (which some availed, every one yielding me to be in hazard of a consumption, even physicians as well as friends) but also for the assistance of the Baths and Bath Waters. And being now for my healths sake setled here, I could not reasonably propose to myself any advantage of practice, where there were three well reputed physicians constantly residing, besides several interlopers both from Oxford and from London, and other parts of the nation, some with, others to look for patients (as still there are, and

will be, for where the carcass is there will the eagles be gathered together.) But it was not profit that I mainly came for but health, which (I desire solemnly to bless God for it) I found to increase daily, and therefore determined here to continue, though I had advice, encouragement and perswasions (particularly from my friend and country-man and fellow collegiate at Lincoln College in Oxford, Dr. Christopher Benner) to remove to London, as the likelyest place for a benficial practice, but doubting whether a close city (having tryed Bristol before I went Westward and finding that not so agreeable), would well consist with my constitution, which always best suited with an open air, I set up my staff here. And contenting my self with that little business that fell to my small share, and demeaning my self to my seniors, with that difference and respect that did (I thought) become me (very different to what some since have shown to me) I was often desired by them to go in their stead to patients in the country, when they were hindred by a full Bath practice here, by which means, in process of time, I had the riding practice for ten or twenty, sometimes thirty miles about, which I submitted to the trouble of (which is not little, considering the very ill ways we have in these parts) till those elder physicians dropping off (and some younger ones too) a considerable share of the Bath practice devolved upon me, and here I have continued a constant inhabitant ever since, form the year 1653 to this new begun year of 97, and to the age of 75, without gout, stone, asthma, dropsie, or any other great disease incident to old age, and not without some considerable success, as to the health and recovery of others, as well as my self, and a far greater advantage then I could reasonably have hoped for. All which I desire solemnly and publickly

to ascribe to the mercy and goodness of the great God only."

Peirce tells us all this, which so far from making it clear why he became a physician, makes us marvel that a man who had been the whole round of human suffering should still feel a desire to contemplate it in others and make it the study of his life. And what is more, judging from his own words at the end of his long and laborious practice, he was sustained by a youthful enthusiasm to the last.

He gives us a curious example of his method during his University career in attempting to know something of the causation of heat in Thermal Waters:—"As I was with some of my companions, wandring in Savoy, I found in the Valley of Lucerne (betwixt the Alpes) a hot spring, I began to consider the cause of this heat, and whereas the vulgar opinion is that the heat of fountains is from mountains fired within, I saw reason to think the contrary, because I saw snow unmelted upon a mountain, from whence this hot spring came, which could not possibly but have been dissolved by the hot fumes of the mountain had it been fired within. Whereupon being unsatisfied I, with my companions, and other labourers (whom I could very hardly perswade to undertake such a business, by reason they were afraid that fire would thereupon break forth out of the ground and consume us), got tools and set upon digging to find out the true cause of the heat of this fountain. After we had digged fifteen days, having perceived before the water to be hotter and hotter by degrees as we came nearer to the source) we came to the original of the heat, where was a great exhibition. In three hours more we digged beyond this place of exhibition and perceived the water to be

cold, yet in the same continued stream with the other that was hot. Upon this I began to wonder much at the reason of these things. Then I carryed to my lodging some of this hot water (which was both saltish and acid) and evaporated it, and of forty ounces I had in the bottom five drachms of saltish matter, which I then farther purefy'd, and extracted thence three drachms of pure nitrous hermetick salt, the other two drachms being a slymy sulphurous substance. Yet with this I was not satisfied, but with my labourers went again to the place, and digged twelve days more, and then we came to a water, which was insipid as ordinary fountain water, yet still in a continued stream with the saltish hot water."

Wood says :—The poor shift that was made in Dr. Jones's time to supply drinkers, before people went into the bath, gave rise to an invention to come at the water, at any hour of the day, pure as it arose out of the bowels of the earth, and entirely separated from the water of the bath. This was a conduit placed over one part of the spring in the King's bath ; and the machine appears in Speed's draught of that cistern, printed A.D. 1610[1] ; Doctor Johnson copied it in the year 1634 ; and Peirce gives us the following description of it, in his memoirs, page 255.

" It was," says he, " a pyramid stone, hollow in the middle, artificially placed over one of the largest springs, on the south east part of that wooden conveniencing, now standing in the King's bath, and was taken away to make room for that structure. A square wall was made about this spring, the

1 It might have been in Speed's map. It is *not* in Johnson's, of which a copy of the original is before us, but with respect to maps Wood is often proved to be wrong on his own testimony.

hollow of which was about eighteen inches diameter, and near upon the same depth. The top stone had a mortice proportionate to the tennon of the pyramidal stone which went in, and held so close that none of the extraneous water could get into its hollow; and the strength of the spring was so great that it forced itself up through the cavity of the pyramidal stone, which was a foot and more above the water, when the bath was at fullest. This water discharged itself at a copper spout,[1] about three inches above the highest water mark, and to this spout some set their mouths and drank, while others put cups and received the water sincere from the spring." The large conduit in the centre was erected soon after the Charter of 1590.

Peirce, without doubt, was, if not the greatest physician of his time, the most useful, and did more in and for his profession than any other man. In intellectual power and literary ability he was inferior to Guidott, but in method, moral decorum, and dignity, Peirce was vastly superior to his rival. Guidott could not resist the temptation of the wine

1 This contrivance has sometimes been confounded with the conduit which occupied the centre of the King's Bath, but it was especially distinct. If our readers will refer to the copy of Van Hove's exquisite little map in Guidott's earlier edition of his "Discoveries of the Bathe" (it is often missing from the later edition) they will perceive a small projection, near the edge on the south side, similar in shape to a coffee pot with a spout. This then was the only provision made as late as 1650 for supplying the waters pure to the drinkers. Previous to that the drinkers got them as pure as they could by their own ingenuity or by the ingenuity of their physicians. Even at a much later period the quality of the water supplied by the pumps was by no means pure. At the present time by a system of interception, and by the exercise of the most punctilious care, the water is absolutely pure. Moreover, it will be seen by the analysis of Mr. Charles Ekin, that not only is this so, but that the whole bulk of waters is as little contaminated by foreign matter as skill and care in the management of the springs render possible.

bottle, and it was not so much what he wrote as what he said when under its influence that brought him into such angry collision with his medical brethren, and ultimately compelled him to leave the city he loved so well. Of Peirce we know little more than we get from his *Memoirs*. But that is enough to give us a clear insight into the character of the man. His "cases" have an advantage over Guidott's, in this respect, namely, that they are classified, and set out with such methodical clearness, that the reader can more readily appreciate their practical value. Then again his "Observations," quaint, and now and then showing a disposition to "dropping-down-deadness" when he refers to his distinguished patients, mark a distinct and progressive phase in Thermal Water practice. As a matter of fact his book is a vast body of practtical information for all time—a standard book of the experience and knowledge acquired through intelligence and patience by a man of no ordinary type and character.

Peirce was surrounded by rivals. The large house, to which we have referred, which stood at right angles with the Abbey House on the south of the King's Bath, the Hart Lodgings, the Three Tuns Lodgings, Mr. More's Lodgings on the north-east in the Abbey Yard, were all reception houses, to which all Peirce's professional rivals sent their patients; but Peirce monopolised the eminent patients of the day, and for nearly fifty years his great house was crowded with wealthy cripples. Charles II. and Katherine of Braganza, with their suite and physician, Greaves, for a while established their court in this not very lively mansion. Katherine, with her saturnine countenance and her remarkable head-gear, resembling a wicker basket,

must have been an object of curiosity to the Bath citizens; but they were loyal and respectful. They had been sickened by the sight of long-faced puritans, nasal drawls, and hideous prayers which breathed aspirations more akin to curses than blessings.

It was to Peirce we owe the publication of Gilmore's map, one of the most beautiful examples of engraving of the period. The importance of the map will be more manifest when it is remembered that we possess no engravings of any kind giving an adequate ichnographic representation of the city at the period when the walls were removed and Wood's great plans carried into effect. This great map, with its border of the fine houses, built after Queen Elizabeth's visit, is the only record we possess of those houses—the only evidence in detail of the character and beauty of parts of the old city. This map was issued with the surrounding pictorial border with the original issue of Peirce's work in 1697. In 1713 there were several copies left, and these were reissued with a new title-page, and with this a copy of the map, without the pictorial border was given. It appears that the whole stock of maps of both sorts was in the possession of J. Hammond, the earliest local publisher of whom we have any record, and he announces the sale of these maps in 1713, as follows:

"There is just now published, a large Mapp of the City of Bath, in four large Sheets, sold in Colours, for 8s. Plain at 6s. by Henry Hammond, who also Sells all other sort of Mapps, all sorts of Novels, and French Books, Plays, Histories, Romances, Japan Ink, London Ink, Inkhorns, Wax, Stampt Paper and Parchment, Bonds, Pens where is also Sold, Tincture Cathartica, or the Essence of Epsom, the Scotch Pill, Daffy's Elixir, &c."

DR. THOMAS GUIDOTT.

Thomas Guidott was born in 1638, but his family were originally from Florence. He studied medicine at Oxford, and after having taken his bachelor's degree, he came to Bath, where he practised with considerable success. In 1679 he went to London. It would appear that he was a man of merit and reputation, as he was invited, in 1684, to teach anatomy at Copenhagen, and, in 1690, a professor's chair in medicine was presented to him at Venice, and another at Leyden. But it does not appear certain that he accepted either of these offers; for his biographers confine themselves to the mention of his writings relative to the mineral waters of Bath.

Guidott, take him for all in all, appears to have been, both in his literary and medical capacity, a very able man, and he rendered great services to the city of his adoption. Naturally a man of a quick and ardent temperament he yielded to the temptation of too much "bibbing" and this brought him into angry collision with his professional brethren, especially with Dr. Peirce, who however proved to be his match in controversy, and more than his match in prudence, reserve, and general ability. But one of the most curious illustrations of Guidott's method of controversy is to be found in his work entitled, "An answer to a late enquiry into the right uses and abuses of bathing."

In this controversial pamphlet, according to our judgment, Guidott has displayed his very highest

gifts. Nor do we think there was any of the usual tendency to arrogate to himself all the knowledge of the subject under discussion. The learning he displayed was prodigious, and the copiousness of his illustrations and the depth of his learning surprising. And yet this pamphlet was the work of his later years, and perhaps for that very reason, there is less of that captiousness and abuse than are to be found in some of his earlier works. This fact is the more remarkable when we consider the wide difference which existed between the combatants, and the character and intellectual peculiarities of his opponent. Baynard, in many respects, strongly resembled Guidott, and like him was apt occasionally to draw his illustrations from the gutter, and his invective was garnished with language savouring of grossness and oftentimes indelicacy. Making due allowance for the difference in style and the construction of words two centuries ago and the present time, there is much to condemn both in Guidott and Baynard. The same remark applies to Henry Chapman, whose work, Thermæ Redivivæ, included in the later edition of Guidott's Collection of Treatises, published in 1725, after his death. Baynard, of whom we shall have something to say, was only so far in favour of hot mineral water bathing and drinking, as they were a preparation for cold water bathing and drinking, and on this question the combatants joined issue. The curious part of the discussion is that only once in his pamphlet does Guidott mention Baynard's name, and then in the postscript. Baynard asserted that "the Cross Bath Pump Room water tastes evidently vitriolick," upon which Guidott's remarks are learned, wise, and convincing, and he ends by quoting Boyle and the *Sieur de Clos*:—"That if we had not had better

helps than the bare use of our senses, we had not had that distinct knowledge of the mineral waters in our own land we now enjoy, and we owe in good measure to the wise industry and great charge of the late truly honourable and immortal Mr. Robert Boyle, whose memory is still dear, not only to myself, but to the best philosophers, and all useful, good, and ingenious persons; nor of those in France, justly attributable to the indefatigable pains, and exact scrutiny of that faithful chymist, whom the King his master so much valued and encouraged, the *Sieur de Clos.*"

There is another circumstance to be noted, namely, that there was no certain method by which the temperature of the termal springs could be tested; and in reply to Baynard as to the relative temperature of the springs, he says:—

"Nor am I yet convinced that the long bath in Bath is the hottest bath we have; touch, I know, cannot discover it. For the water of the long bath, being so far distant from that of the King's, with which alone it stands in competition, that trial cannot be made of both at once. And that person shall pretend to remember the degree of heat in the one, when he toucheth the other, had need of a better memory than I have (which yet I never had any reason to blame) to assert it; and whosoever shall read a treatise in Latin, printed not many years since, under the title of Thermæ Britannicæ (for it doth not appear by anything more than the name of the Long Bath, that the author knows there was any such extant), will find that the latter end of the first chapter, a table exactly computed, according to a thermometer, with spirit of wine, wherein the bottom of the King's Bath (the main spring all in) to be

return'd at one foot, eight inches, and seven parts, on the neck of the glass in the summer season; when the Long, or Hot Bath, commonly so call'd, amounted only to one foot, five inches, and as many parts difference on the King's Bath side; which, I presume, could not so exactly be discovered by the touch of the ingenious author, or any other." The question, however, has been decisively settled contrary to Guidott's opinion.

As an example of his disposition and energy, we give a story as told by himself in relation to internal heat and its causation :—"But we have been so long taught that because fire heats, therefore, we have very few that will seek for, or respect any other cause of the heat of hot baths, than an actual fire under ground; in the asserting of which, they have so many places, pabulas, subterfuges and shifts, that ever since I first read the learned Dr. Jorden, I discharg'd the old idle fancy of the antients, and became an intire convert to his opinion."

Besides the specific reply to Baynard, Guidott demolishes many of the theories of older writers, but his subject is so overladen with learning as often to obscure his meaning. On causation, and the theory of a central fire, he is clear enough.

As the sting is usually in the tail, so Guidott reserved his sting for the postscript :—"And as to the cures are said to have been done by the use of the Cold Bath 'tis too well known to be the common artifice of all quacks and empiricks to create a good opinion of their medicines." This *brochure*, Guidott says, "is my last kindness to the Bath," and it must be remembered that at this time he was not a resident in Bath.

Guidott's works are as follows:—

(Added to Jorden's Discourse).—*An Appendix concerning Bathe; wherein the Antiquity both of the Bathes and City is more fully discussed; with a brief account of the Nature and Virtues of the Hot Waters there.*—8vo. London. 1669.

A Letter concerning some Observations lately made at Bathe. Written to his much honoured Friend Sir E. G(reaves), Knight and Baronet, M.D., in London. London, printed by A.C. for Henry Brome, at the Sign of the Gun, at the West End of St. Paul's. 1674.—Sm. 4to. Title and 12 pp.

A Quare concerning Drinking Bath water at Bath. Lond. 8vo. 1657. "Published under the name of Eugenius Philander, in his Thermæ Brittannicæ, c. ii. Rawlinson says he enlarged this, with the addition of several Roman Antiquities, in 1691. We are doubtful about this. It is probable such enlargement may exist somewhere in MS.

A Discourse of Bathe, and the Hot Waters there. Also some enquiries into the nature of the Water of St. Vincent's Rock, near Bristol; and that of Castle Cary. To which is added a Century of Observations, more fully declaring the Nature, Property, and Distinction of the Bathes. With an Account of the Lives, and Character, of the Physicians of Bathe. By Tho. Guidott, M.B., Physician there. Virtute vincam Invidiam.—London, printed for Henry Brome, at the Gun, in St. Paul's Churchyard, the West End. 1676.—8vo. Pp. 200. The Dedication and Preface are unpaged. Plates of Roman Antiquities, etc. The "Century of Observations" and the "Lives of the Physicians" have separate title-pages, but are paged consecutively with the rest of the work.

Thomæ Guidotti Anglo Britanni de Thermis Britannicis Tractatus accesserunt, odservationes hydrostaticae, chromaticæ, et miscellaneæ, unius—cujusq; Balnei Bathoniam naturam, proprietatem et distinctionem curatius exhibentes, &c.—Plates. London. 1691. 4to.

Cl. Viri Johannis Maplet, M.D. Epistolarum Medicarum Specimen de Thermarum Bathoniensium Effectis, ad clarissomos medicos, D. Bate, Fraser, Wedderburne, &c. Edente Thomas Guidott.—London, 1694. 4to.

An Apology for the Bath; being an Answer to a late Enquiry into the right Use and Abuses of the Bathes in England, so far as may concern the hot Waters of the Bath, in the County of Somerset; with some Reflections on fresh Cold-bathing, Bathing in

Sea-Water, and dipping in Baptism. In a Letter to a Friend. By the author of the Latin tract, De Thermis Britannicis. . . . London, printed for G. Sawbridge, at the three Flower-de-Luces in Little Britain. 1705.—8vo. Pp. 115.

A Collection of Treatises Relating to the City and Waters of Bath, . . . All written by the learned Thomas Guidott, M.B., late Physician at the Bath. To which is added, Thermæ Redivivæ; or, the City of Bath described, &c. By Henry Chapman, Gent. London: Printed for J. Leake, Bookseller at the Bath. MDCCXXV.—8vo. Pp. 430.

DR. EDWARD BAYNARD,

Of whom we have made mention in our notice ot Guidott, is a man of which many medical practitioners will read of for the first time. His work entitled—

ΨΥΧΡΟΛΟΥΣΙ'Α
Or, the
HISTORY OF COLD BATHING,
Both Ancient and Modern,
&c., &c.
By Dr. EDWARD BAYNARD, Fellow
of the College of Physicians, London.
In Two Parts.

The first part is written by Sir John Floyer, of Lichfield, Knight, and the second part and Appendix by Baynard, but the whole work is edited by him. The fourth is the rare edition, and the one to be got, because of the Appendix. We have no intention of entering into the subject matter of Baynard's work. It may be a matter of surprise that when the "Cold

Water Cure" was the rage some years ago, Baynard's work, in conjunction with that of his co-author, Sir John Floyer, was not reprinted. We suspect, either that it was so little known as to have escaped the attention of the cold-water votaries, or that Baynard, advocating the partial use of hot mineral waters, was not considered "sound." We cannot help thinking that Baynard was inconsistent, and was trying to please both parties. When in Bath he was an advocate for the Bath waters, and when he was in Lichfield he did what his patron, Sir John Floyer, did. "I cannot join with Agathinus, in his wonderful encomiums of cold bathing, as he is quoted by Oribasius, physician to Julian, the (Apostate) Emperor, wherein he instances the frequent use of it in himself, and recommends it to the world, as a most wholesome and salubrious practice, and seems to have but a low and languid opinion of the use of hot baths. For with due respect to so great a man (as doubtless he was in his generation) I must take leave to dissent from him, and by way of digression tell you, that I have at least, for the space of 36 years, (one summer or two excepted) constantly visited the hot baths at Bath, in Somersetshire, as a physician, and have seen wonderful and most deplorable cases there cured, and some in a very little time, where care and caution has been observed in the use of them; and especially in the West-India gripes and colicks, where a paralysis has been general with a total loss of their limbs; and others with arms, hands, legs and feet strangely contracted; yet the bath has cured both the solutions and contractions, which being contrary operations, is past in philsophy to find out how such cures are wrought; without, as Helmont says, it be my comforting the *Archeus* with mild and gentle warmth; for 'tis a

friendly fomentation, a natural *sal volatile oleosum*, a cordial to the faint and languid spirits, and puts them in a power to act more vigorously."

We give one "case" amongst others which he relates of remarkable cures. But then, as he says, these cures so much depended upon the physician, whether he could "distinguish between a kettle-drum and cart-wheel":—"But now as to the other ladies case I mention'd, she was brought to the bath in extremis, with all the frightful symptoms of death upon her, visible in the ghastly look of her face accompany'd with despondency, sighing, swooning, singultus and convulsions, with an universal atrophy, yet by due care, and the powerful vertues of the warm Bath waters, by slow and gentle steps, by gradual accessions, in the space of six weeks she acquir'd such a stomach, such a constitution, that she danc'd in the town hall; nor did she receive her cure from drinking only, but was comforted and refresh'd with the mild and gentle warmth of the Cross Bath."

We confess our chief object in noticing Baynard is bibliographical rather than biographical. He tells us some facts of which we never heard before, and he has given us the clue to other facts which we could not previously quite understand.

In the course of his practice in Bath Baynard met with some remarkable characters. In 1811 he tells us he met in Bath with Selkirk, of whom he says:—"And that remarkable story of Alexander Selkirk, a Scotchman, who from a leaky ship was, upon his own request, set on shore on an island in the South Sea, call'd Juan Fernandes, about the latitude of 33 degrees, where he liv'd alone, and eat nothing but goat's flesh and drank water, having neither bread nor salt, as he told me himself at the bath, where I met him;

and that he was three times as strong, by exercise and such a diet, as ever he was in his life: But, when taken up by the two ships, the Duke and Duchess, set out from Bristol for the South Sea, that eating the ship-fare with the other seamen, and drinking beer, and other fermented liquors, his strength by degrees began to leave him, like cutting off Samson's hair, crinit'm (to make a word) or lock by lock; so that in one month's time he had not more strength than another man."

It was, moreover, in Bath that Baynard met with "William Pen, Governor of Pensilvania."

"About three or four years since, the famous Mr. William Pen, Governor of Pensilvania, being at the bath, I went to pay him a visit; being very well and long acquainted with him, and discoursing about the Indians' manner of curing their diseases, especially fevers, by sweats, and immediately bouncing into cold water; of which I have given his account more at large, in the last impression of Psychrolousia, p. 512, and talking upon this head, he assured me that a servant of his there present, who gave me this account of himself, that being long vexed with wandering pains, especially when warm in his bed, and also had some aguish accessions, and finding no cure nor sleep by those remedies he had taken, and having good store of water prepared below stairs for washing, he, in the height of his pains, leaped from his bed, down he went, threw off his shirt, and flouced into one of the largest vessels of water, it being a very cold night; he got out soon, and ran thus naked once or twice round the garden, and then suddenly into the water again; so out and round the garden once or twice more; then taking from his cupboard, or buffet (for he was his butler) a good

swigg o brandy, went to his bed. This threw him into a most violent sweat, which he continued in until eight or nine in the morning; and not rising as usual, a servant maid coming to call him hollow'd, or spoke very loud, as she used to do (for he was deaf to a great degree) the fellow answer'd with some sharpness, 'You need not gape so loud, for I can hear you.' And from that moment recovered his hearing, and continued so; as also, was free'd from his rheumatic pains, and other complaints."

But we have something to add to this. It was in 1811 that De Foe visited Bath and the West of England for the purpose of obtaining information on that part of the country for his "Tour through the Island of Great Britain," the first volume of which was issued in 1724, the second in 1725, and the third in 1727.[1] It was in Bath where De Foe, in that same year (1711) met Selkirk, and, although we have no direct evidence of the fact, it seems most probable that these two remarkable men talked over their vagrant wanderings, and that De Foe first conceived the idea of writing Robinson Crusoe, the first edition of which appeared in 1719.

Baynard was a poet, that is, he wrote in verse. He was a great advocate of temperance, but unlike some modern apostles of that exemplary virtue, he preached the virtue both as it related to eating and drinking. Throughout his amusing and witty treatises it is clear that the success of his treatment was due to the earnest enforcement of moderation in all things, combined with exercise, and a rude but effective system of *massage* and pumping, and what the energetic young man of to-day calls "tubbing." We give a few examples of Baynard's "poetry,"

1 Afterwards edited by Richardson, and published in 4 vols.

and if he lacked the true *afflatus*, at any rate he possessed the attribute of fun and humour:—

But when alas! Men come to die
Of dropsy, jaundice, stone and gout,
When the black reckoning draws nigh,
And life (before the bottle)'s out:

When (low drawn) Time's upon the Tilt
Few Sands and Minutes left to run;
And all our (past gone) years are spilt,
And the great Work is left undone,

When restless Conscience knocks within
And in dispair begins to baul,
Death like a Drawer then steps in,
And asketh, Gentlemen! d' ye call?

I wish that men would timely think
On this great Truth in their full Bowls,
Both I and Will of Ludgate-hill,
And all our Friends around S. Paul's.

As the Divine Herbert has it,
"A verse may find him whom a sermon flies,
And turn delight into a sacrifice."

A short dehortatory Poem to a Claret-prone Kinsman and Godson of mine, against immoderate Drinking:—

Pass by a Tavern-door, my son,
This sacred Truth write on thy Heart;
'Tis easier, company to shun,
Than at a Pint it is to part.

For one Pint draws another in
And that Pint lights a Pipe;
And thus in th' Morn, they tap the Day,
And Drink it out e'er Night.

Not dreaming of a sudden Bounce,
From vinous sulphurs stir'd Within;
Which blows a Drunkard up at once,
When the Fire takes Life's Magazin.

An apoplexy kills as sure,
As Cannon Ball: and oft as soon;
And will no more yield to a cure,
Than murd'ring Chain-shot from a Gun.

Why should men dread a cannon bore ?
  Yet bold 'broach a Pottle Pot,
That may fall short, shoot wide or o're,
  But Drinking is the surer Shot.

How many Fools about this Town,
  Do Quaff and Laugh away their Time ?
And Nightly knock each other down,
  With Clarret Clubs, of no Grape Wine ?

Until a dart from Bacchus Quiver,
  As Solomon describeth right,
Does shoot his Tartar thr'o the Liver
  Then (Bonus Nocious) Sot, good night.

Good Wine will kill as well as bad,
  When drank beyond our Nature's bounds ;
Then Wine gives Life a mortal stab,
  And leaues her welt'ring in her wounds.

Wounds ! that no Physick art can heal
  And very rarely that they feel
The Stroke, the moment it does Kill.

[Guidott and Peirce both refer to "riding practices." These "riding practices" are little understood now. Peirce refers to the "bad ways," *i.e.*, the roads, which were rough paths for the most part. Peirce, during his earlier career, that is, before he entered upon the Abbey House, had an extensive "riding practice," in other words, he had many country patients. The country physician, to avoid the fatigue caused by the clumsy saddle of the period, rode sideways, like a woman, on a sort of luxurious *pillion*, with a back to it, and foot-cloths. If he were a "swell" he was, in severe weather, usually accompanied by a servant with a "leading rein," he himself having his hands encased in a muff, to keep his hands white and soft, in order, as a writer of the period says, that he "might be able to discriminate to a nicety the qualities of his patient's arterial pulsation," an explanation which forbids the very thought of vanity.]

CHAPTER V.

THE BATHS, ETC.

"Man's rich restorative! his balmy bath,
That supplies, lubricates, and keeps in play,
The various movements of this nice machine,
Which asks such frequent periods of repair,
When tired with vain rotations of the day."

Young.

THE BATHS AND PUMP ROOMS.

The Mineral Springs, Pump Rooms, and Baths of Bath, are situated in the southern part of the city, in the vicinity of the Abbey Church, not far distant from each other, and easily accessible from all parts of the city. (See plan.)

There are three Springs, one Grand Pump Room, and five establishments for public and private bathing, including douche baths. All of these are the property of the corporation. One spring supplies the fountain in the Grand Pump Room, the King's Public and Private Baths; the large tepid swimming bath for males; the New Royal Private Baths, and Swimming Bath 80 feet in length, (with 17 dressing rooms, paved with encaustic tiles and provided with handsome cooling room)

for ladies and gentlemen on alternate days, adjoining the Pump Room Hotel; and the baths in the Royal Mineral Water Hospital. A second supplies the Cross Bath, and a third, the Hetling Pump Room; the Royal Private Baths; the Hot Public Bath; and a bath in the Royal United Hospital. In former days, the last mentioned spring also supplied the Lepers' Bath, which was falling into disuse in 1773, and together with the Leper's Hospital attached to it was probably removed in 1777, when the present Hot Bath and Royal Private Baths were built. If an additional supply of water be required at the Royal Private Baths, as is sometimes the case, it is obtained from the spring at the King's Bath.

THE GRAND PUMP ROOM.

(With Illustration.)

This room, erected in 1796, under the direction of Mr. Baldwin, the City Architect, is situated in the Abbey Yard, adjoining the King's Public and Private Baths. Its architecture is Corinthian; is eighty-five feet in length, fifty-six in breadth, and thirty-four in height, affording ample space for promenading to those who drink the waters. In the recess at its eastern end is a marble statue of Beau Nash, executed by Prince Hoare; the right hand of the figure rests upon a pedestal, on the face of which is delineated a plan of the Bath Royal Mineral Water Hospital, towards the establishment of which national charity he greatly contributed by his exertions in obtaining donations of money, and of which he was one of the Treasurers, from the time that it was opened for the reception of patients, in 1742, until his decease in 1761. At the western end is an orchestra for the band, which attends there daily during the winter months of the year. There are three entrances on

the northern side, opposite to the principal entrance; within an apse on the southern side is a fountain, which is supplied direct from the spring, with a continuous stream of mineral water, at a temperature of 114° F. The supply of water from the spring to the fountain, amounts to eight gallons and a half a minute. This room is opened on week-days from 8 a.m. to 6 p.m. during the whole year: on Sundays from 12.15 p.m. to 2.0 p.m. throughout the year. At the south-western end of the Pump Room there is a convenient entrance to the King's Baths.

THE KING'S PUBLIC AND PRIVATE BATHS.

(See Plan.)

PRIVATE BATHS AND DOUCHES.

The Private Baths occupy the upper story; the Public Baths are on the basement story; they were built according to the plans of Mr. Baldwin, the foundation stone having been laid May 10, 1788. On the upper story there are four baths, of which one is a reclining-bath, lined with white porcelain tiles, fitted with taps, by means of which it is supplied with hot and cold mineral water; the other three are large baths similarly lined, each of which will hold 864 gallons of water, with a depth of four feet six inches. In each there is a douche for the local application of the water, if required, while the bather is in the bath. They are sufficiently large to afford space for the free movement of the bather, and occupy the greater portion of the bath-rooms, which are twelve feet long, seven feet wide, and eleven feet high. The hot water is thrown up from the bottom of the bath, and the cooled mineral water is turned on from a tap above the steps, and, as it flows over them into the

bath, mingles with the hot water. To all the baths convenient and comfortable dressing-rooms and closets are attached, containing every requisite for the invalid. In addition to the baths, there are also two douche rooms, and a room containing a thermal vapour and shower bath of the most approved construction. Also quite recently two handsome rooms, 19 feet high, have been added, the walls and ceilings of which are lined with tiles. These rooms are used as Aix-le-Bains douches, approached through either of two dressing rooms, which are so arranged as to economise the time of the bathers.

DOUCHE ROOMS.

These rooms are each connected with a dressing-room, and are for the local application of the water, or "dry douching," so-called, in contrast with the the douche used in the bath. The distribution of water may be regulated by the attachment of large, small, or perforated nozzles to the douche pipe, so that a larger or smaller stream may be made to descend on the part douched, or it may be more gently applied by means of the perforated or rose nozzle.[1] Here also are provided tepid and cold mineral water, as well as hot douches.

There are also two closets heated with hot air, from which warm towels, flannel, and linen are supplied to the bathers. Other arrangements may be seen by referring to the plan of the building.

The water may here be obtained at any temperature up to 114° Fahr.

From March until September all the above-mentioned baths are open to the public from 6 a.m. to 9 p.m.; and from September to March from 7 a.m. to 9 p.m. On Sundays, throughout the year, from 7 a.m. to 9.30 a.m.

1 Formerly the douche process was effected by a large bucket.

PUBLIC BATHS.

These baths are reached by descending a staircase from the passage leading into the Pump Room. The King's Bath, which is open to the sky, is a very capacious bath. It is somewhat more than fifty-nine feet in length, and nearly forty in breadth. When filled, it is computed to contain 56,332 gallons of water, with a depth of four feet and a half.

On the northern side of this bath is a corridor, out of which are entrances to dressing-rooms, which either communicate with the bath, or contain in them reclining-baths. Those rooms which communicate with the bath were formerly called "slips." At the eastern end of this corridor there is an inclined passage for wheel chairs, which is approached by an entrance in Abbey Place, communicating with the Abbey Yard. On the northern side of the bath there are three large reclining-baths, and three flights of steps leading from as many dressing rooms into the water. One of these flights of steps communicates directly with the bath, while the other two lead into large recesses, having partly glazed doors, which may be closed so as to convert the recesses into distinct baths, or the bather may pass through them into the open bath. Thus an opportunity is afforded to the invalid, of enjoying either a private or an open bath, as taste may incline. On the same side, but within the boundary of the bath, are three recesses furnished with seats for the convenience of bathers.

On the eastern side, there were other recesses, which admitted of being partially closed in. The colonnade has recently been removed, and the old recesses and seats, together with a flight of steps leading into the bath, have been uncovered and restored.

On the south side there is a stone chair and bench, the former bearing the following inscription, "ANASTASIA GREW GAVE THIS 1739." Above the stone chair is a mural tablet recording the gift of an ornamental balustrade for the bath, by Sir Francis Stonor, in 1697,[1] the ornamental portion of which between the balusters was restored a few years ago, and a balustrade of the same pattern placed on the eastern side of the bath. Not far distant from this tablet is a figure of Bladud in a sitting posture, and below it an inscription on copper, dated 1699. According to Stukeley this statue formerly occupied a niche in the North Gate above the arch, where, in 1363, it represented King Edward III. It was taken down from thence and somewhat altered, by a common mason, to represent King Bladud, and then transferred to the King's Bath. Many of the brazen rings, attached to the walls of the bath, commemorate the benefits received by the donors from the use of the waters; others were placed there for the benefit of bathers by the Corporation. According to Guidott, there were 208 rings in all the Baths, of which only twenty-nine remain at the present time. Some, it is said, were sold for old brass, one or two of which have been recently recovered.

On the western side are two flights of steps leading from dressing rooms: one, formerly near the Queen's Bath, communicates with the open bath, and the other with a recess within a colonnade, partially closed in, from which, however, the bather can enter the open bath.

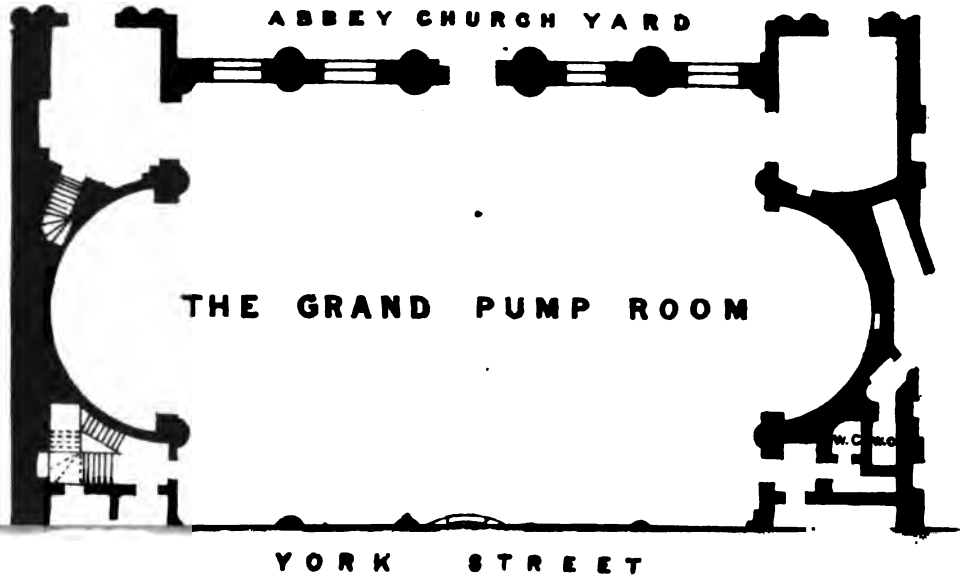
1 Guidott gives the date 1624, which is also given by Dingley in his "History from Marble," vol. i., p. 48. The date, 1697, is on the tablet and there are no indications visible of its having been altered. It has been suggested that "there were two persons of the name, who successfully commemorated themselves at Bath." We think this statement has no foundation in fact.

THE KING'S AND QUEEN'S BATHS.

Beneath this bath the spring rises over a surface of about 40 feet square.

Around the spring the Romans formed a reservoir, octagonal in shape, 40 feet at its narrowest width and 49 feet at its largest. The walls forming this reservoir were 3 feet wide, built of solid block stone, and lined on the inner face with lead varying in thickness from $\frac{5}{8}$ths to 1 inch. The upper portion of the lead lining was removed in earlier times; but future generations will with difficulty believe that in this enlightened age, and after the Philistinism and barbarous destruction of a former age, and especially after the elaborate assurances of conservation, care, and jealousy with which all recent discoveries were to be watched and preserved, that this lower and more massive portion was removed and sold; but so it was, and true archæologists, who rightly appreciated the historical importance of this antique work stood aghast at such an act of vandalism.

After the Roman occupation, a comparatively long period followed, when all was obscurity and uncertainty. The Baths were neglected, if not altogether deserted and left to utter ruin. The theory, the data of which has been withheld from us, to which we have already adverted, that the Britons made their last stand at the Baths, after the battle of Deorham, and were there slain, and the Baths desolated by the Saxon force, if it could be established, would be importaut in itself, and at the same time would change much that at present is obscure. There was an interval marked by violence, when the city was occupied by a degenerate and mixed race; moreover



a people to whom the luxurious habits and the refined tastes of the Romans would be regarded with contempt. This was the interval, as it seems to us, when the magnificent works raised by the Romans, would have suffered neglect, violence, and destruction. Besides, there is nothing to justify the suggestion that the Saxons would be likely to destroy that which they had won. The battle of Deorham was so decisive that only a small, broken, scattered force of the British could have reached Bath before their enemies, and could have made no "stand" anywhere. And, again, if so awful a carnage took place, what has become of the bodies which must have been buried in the ruins?

The space around the well, which is 15ft. from the bottom, is built of a circular shape, in ashlar; and here, where the water rises at times with considerable force, and discharges large volumes of gasses, the bath is the hottest. The whole body of water in the bath is continually undergoing a change, as openings are provided in the sides of the bath, at the water level, so as to convey away the superfluity. The quantity of water yielded by this spring is estimated at two hogsheads and a half a minute. Its temperature at the bottom of the well is 117° F.; within the enclosed space, 116° F.; while in different parts of the bath it ranges from the last mentioned degree down to 100° or 98° F., according to the distance from the exit of the spring.

At the time when Anstey wrote his "New Bath Guide" this bath was frequented by ladies dressed in the extreme of fashion, and gentlemen in powdered hair and bag wigs sociably enjoyed the bath together.

Robert Pugh[1] speaks more fully on this subject: —"Intrant hæc balnea viri subligaribus linteis umbilico tenus induti, pileolisque nocturnis ab aurâ defensi cætera nudi, nisi cui libuerit interulis ex simplici linteo et pro more loci vittatis reliquum corpus tegere ; quod antehas perhibent non sine maculosæ aut illuvie scabræ eutis suspicione factum, eique vitandæ coactos tunc omnes nuda pectora scapulasque, ut plerisque jam est in usu, ab omni, contagione integras ostentare. Fœminæ pariter ex simplici et necdum insolato linteo talaribus vestiuntur supparis, quibus pro cujusque gradu aut arbitratu plus minusve ab atris tæniis ornamenti additur ; quemadmodum et capitum calanticas et cincinnorum redimicula, honestioribus quibusque versicoloribus vittis et lemniscatis segmentatisque laciniis concinnare modestè tamen et veluti nocturno cultu, mos est. Quinetiam in *Crucis* balneo ipsi considentium fœminarium fornices elegantibus faciis institisque aut reticulatis affectatæ verecundiæ velamentis obtenduntur." (Bathoniensium et Aquisgranensium Thermarum Comparatio, 1676, p. 59.)

Dingley gives a brief account of the costume of the bathers, and says, "The men entered (the bath) with waistcoats and drawers for the purpose (of bathing), and the women with yellow shifts set off with ribbons."[2]

In the days of Jones there was a difficulty in getting the water pure enough to drink. Twenty years later this difficulty was overcome by a conduit being placed over a part of the spring. This conduit,

1 The author of this work was a priest, a native of Carnarvonshire, and Confessor to Henrietta Maria. He was one of the victims of Titus Oates's plot, being tried for high treason unjustly condemned, and died in Newgate.

2 "History from Marble," vol. i., p. 46. 1684.

Wood says, is represented in Speed's map of 1610, and it is copied by Johnson in his map of 1634, and a description of it will be found in our notice of Dr. Peirce.

THE QUEEN'S BATH.

The Queen's Bath no longer exists. It was formerly known as the *New Bath*, constructed in 1597, at the cost of Mr. Bellott (the founder of Bellott's Hospital), received its later name on its being used by Anne of Denmark, Queen of James I. After this it was enlarged, and a cross erected in the centre, having on its summit a figure of the Crown of England, surmounting a globe on which was inscribed in letters of gold, "ANNÆ REGINÆ SACRUM."[1] The Queen forsook the King's Bath in consequence, it is related, of a circle of light appearing on the surface of the water while she was bathing in it. This Queen first visited Bath in 1613, and it was on her second visit to this city, in 1615, she left the King's Bath, and the cross above mentioned was afterwards erected, which appears to have been removed some time about 1732.

The removal of the Bath was rendered necessary but it occasions no sort of public inconvenience, The exigences of modern bathing requirements demanded that, in addition to the ordinary system of bathing, facilities should be afforded to the public for obtaining all the advantages of the Aix-les-Bains and other Continental appliances in connection with our inexhaustible and invaluable springs. It is found that the very important and complicated apparati, as well as portions of the structural arrangements, of the new baths, are not in a sufficiently forward condition to admit of their being adequately

1 Warner's History of Bath, p. 32. See also notice of Dr. John Sherwood.

described in this—the appropriate—part of our work. Therefore, with the view of doing justice to a feature in our system of Baths, which has been so long and urgently felt, and at length so munificently provided by the Corporation, we have deferred the detailed account of them to that part of the work which deals more especially with the medical treatment of disease in a later chapter. The plan, however, will show with comparative accuracy the internal arrangements.

With the overturning of the walls and falling in of the roofs, after the Roman occupation, the baths and reservoir were partially filled with the debris, the outlet and culverts choked, the reservoir being further filled by the sand brought up by the springs themselves. For many centuries the sand thus deposited served as the floor of the King's Bath, until many years ago it was paved with stone. This floor, with the sand and debris beneath it, has now been removed down to the original level, and the Roman reservoir again serves its original purpose. Its whole area is covered by arches of cement concrete, the upper surface of which forms the floor of the present bath. At the centre there is an aperture through which the water rises in the well built above it, and overflows into the bath just above its surface. In excavating this Roman reservoir it was found that a portion of the Pump Room walls over it rested upon stout planks of timber laid upon the rubbish to be removed. This timber was cut away bit by bit, and successive piers of masonry built up from the original level of the ground from which the springs rise. The greater part of the masonry forming the south wall of this bath is the original Roman wall—that on the east being mediæval, and that on the north and west sides work of the last century.

The removal of the Queen's Bath has led to the clearance of (with the engine and boiler house) the site of the circular Roman bath beneath, which at present is entirely uncovered, and has a most striking appearance. Adjoining this circular bath and in connection with it are others, forming a perfect suite, and shewing the complete arrangements of the system of bathing practised by the Romans. The circular bath alone, however, has been preserved; all else which lies under the new building has been either partially destroyed or wholly obliterated. All that remains of it are a bit here and a bit there, which may be seen, but deprived of their essential interest, all meaning and continuity of design and purpose being actually destroyed.

THERMAL VAPOUR AND SHOWER BATH.

In order to utilize the vapour from the springs rooms have been fitted up adjoining the King's Baths with all the appliances which science can suggest and experience recommend. In one corner of an apartment, which is tiled throughout and laid with a tesselated pavement, is a box-like structure. Herein a patient may take his seat, the whole of his body, with the exception of his head, for which an opening is specially provided at the top, being subjected to the action of the vapour that rises in full volume direct from the springs beneath. Through a central reservoir or drum in another part of the room the vapour is conveyed in various ways, being either inhaled or locally applied by means of various ingenious contrivances. In cases of gout, rheumatism, or any of the varied forms of skin disease, such facilities are invaluable, the treatment having been proved to be most effectual. At no other spa either in England or on the Continent can the water or the

vapour be used to such advantage, and a higher temperature can be gained here than elsewhere, viz., from 112 to 115 degrees. The appointments of the Baths are as complete as they can be made, whether we regard the comfort of the bathers, the efficiency of the appliances, or those æsthetic considerations which modern taste and refinement can suggest.

THE CROSS BATH.

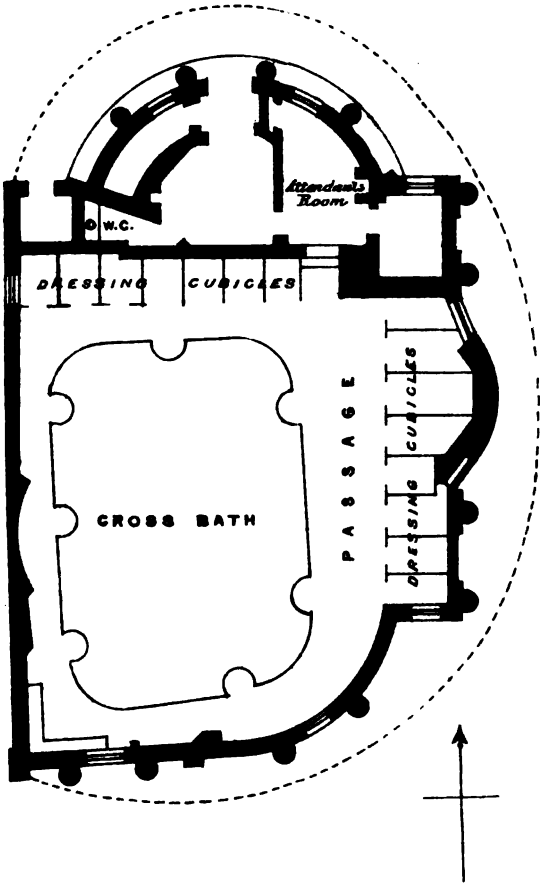
(See Plan.)

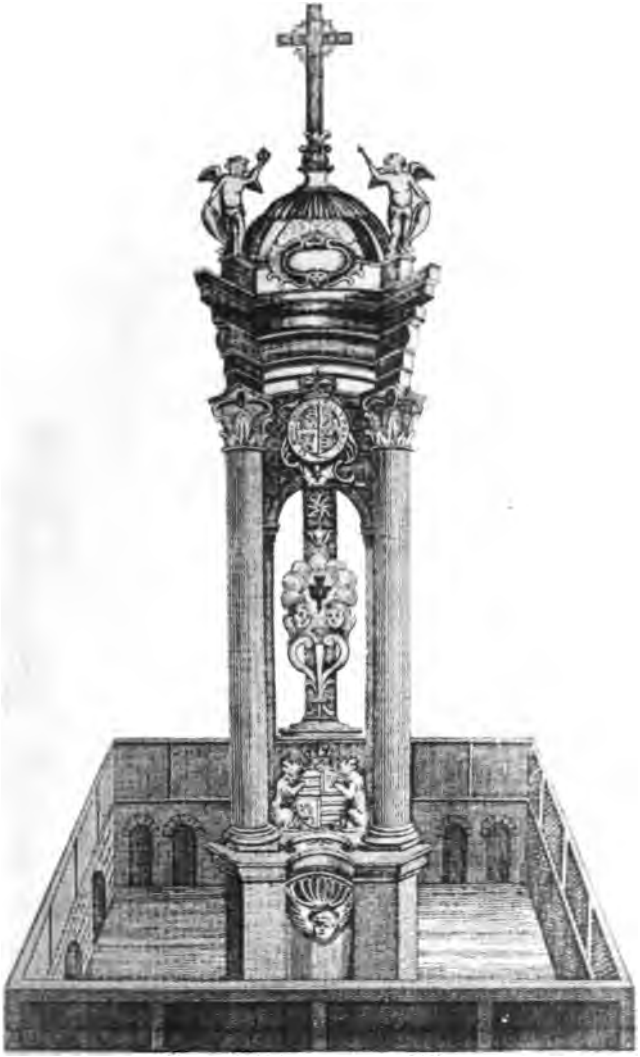
This is a cheap public bath. It is of an irregular form. The building is at present roofless, but presumably this is only a temporary disadvantage. In other respects the bath has been repaired, much improved, and made one third larger, under the supervision of Mr. Davis. The reservoir was almost filled with the accumulated rubbish of ages, which has been removed, and the waters, as in the King's Bath, rise straight up from the Roman spring. The spring supplying it rises from a depth of fourteen feet below the flooring of the bath, and yields half a hogshead of water a minute. The temperature of the water at the depth above mentioned is 104° F.; that of the Bath generally 96° or 98° F.

The present edifice was erected from plans by Mr. Baldwin, the City Architect. On the southern side was a figure of Bladud in *alto relievo*.[1] In the centre of the bath there formerly stood an elaborate structure surmounted by a cross, which was erected by John Drummond, Earl of Melfort, Secretary of State to James II., in commemoration of the Queen (Mary of Modena) having used this bath, with happy results,

1 This is now lying in the corridor of the Baths mentioned in the next page. It was designed by W. Hoare, and is a figure of merit. At present it is uninjured, but there is great danger of its going the way of many other works of the past, which, if not of great value, were interesting. The old Hetling Pump-room contains many relics of the past. We should like to trace the Cross of Anne of Denmark, as well as that of Lord Melfort.

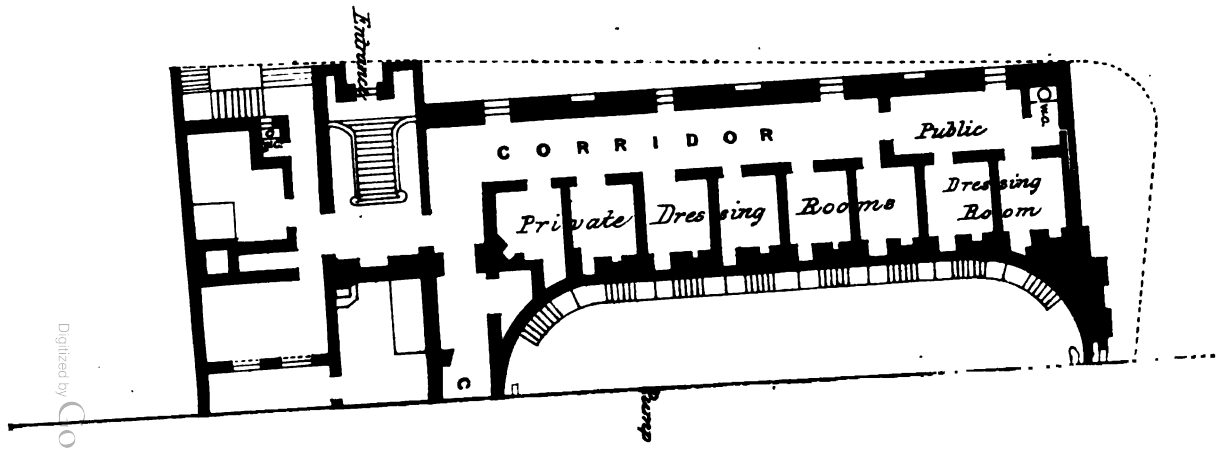
THE CROSS BATH.





The Cross erected in the centre of the City Bath. A.D. 1688

CROSS, FORMERLY IN CROSS BATH.



in 1688. Around this bath are arranged thirteen convenient dressing rooms, and a small common one, with closets adjoining. Bathers bring towels with them, or they are supplied by the attendant, for which there is a small additional charge. This bath was in former days much frequented by the gentry frequenting the place, and the following account gives a description of how they bathed in it:—"In the morning, the young lady is brought in a close chair, dressed in her bathing clothes, to the Cross Bath. There the music plays her into the bath, and the women who tend her present her with a little floating wooden dish, like a bason; into which the lady puts a handkerchief and a nosegay, and of late years the snuff-box and smelling bottle are added. She then traverses the bath, if a novice, with a guide; if otherwise, by herself; and having amused herself near an hour, calls for the chair, and returns to her lodgings."[1]

THE ROYAL PRIVATE AND HOT BATHS.

(See Plan.)

Immediately opposite to the Hetling Pump Room are the Royal Private Baths and the Hot Bath.

On the outside of the former and within a recess open to the street is a pump, from which the hot mineral water was gratuitously supplied to any person who might wish to drink or carry away small quantities of it to those who are invalided at home. *It was intended for the advantage of those only, who were unable to subscribe to the Pump Room.* This is now closed.

The Hot Bath, which is an open bath, is situated in the centre of the Royal Private Baths. The

1. *A Tour through the whole Island of Great Britain.* By Defoe, 1725. 6th Edit., 1761. This edition was edited by Richardson, the novelist. A handsome cooling room has been added to these Baths.

entrance to it is at the southern end of Hot Bath Street. This bath is of an octagonal form, and its architectural embellishments are well deserving of notice. At the four corners of the bath there are small seats for the bathers, and there is also a Douche Pump on its northern side. The temperature of the spring, which rises seventeen feet below the pavement of the bath, is 120° F., while the temperature of the water varies in different parts from 105° F. to 102° F. The spring yields one hogshead and a half of water a minute, and supplies the Royal Private Baths, as well as the Hot Bath, and also a bath in the Bath United Hospital, in the immediate vicinity. When full, the Hot Bath is computed to contain about 9,570 gallons of water, having a depth of four feet and a half.

THE ROYAL PRIVATE BATHS AND DOUCHE.

The chief approach to these Baths is under a semi-circular covered way, from an entrance at the northern end of Hot Bath Street, opposite to the Hetling Pump Room. There are four principal Baths.

The first, the Bladud, or Marble Bath, is a small bath, somewhat approaching in form to a reclining bath, lined and paved with marble, the surrounding space being laid down with encaustic tiles, and the rest of the bath room decorated in keeping with its other arrangements. There is a dressing room adjoining it, with every requisite convenience. The door, which closes in the latter room, separates it and the bath room from the rest of the building. The second, or Alfred's Bath, contains, when filled, 724 gallons of water, with a depth of four feet and a half, and has a dressing room attached to it. Adjoining this room is another dressing room communicating

with a Douche Room, having all the necessary arrangements for the use of the Douche, the water from which is discharged by a pressure equal to six pounds on the square inch. Beyond this is a dressing room, connected with the third or Chair Bath, containing an arm chair, attached to a crane, by means of which a helpless invalid can safely be let down into, and raised up from, the bath. This bath, when filled, contains 702 gallons of water, with a depth of four feet and a half. Adjoining this bath is a dressing room, having in it a Shower Bath. This room is also connected with a small chamber, containing the Lavement apparatus and ascending douche.

Adjoining the last-mentioned room is the fourth, or Edwin's Bath, which, when filled, contains 716 gallons of water, and has a depth of four feet and a half. Attached to it is a dressing room, and douche apparatus.

All the above-mentioned baths in this establishment have arrangements for the use of the douche in them.

Near this bath is a small lobby leading into a corridor, at the upper end of which is a room containing a large Reclining Bath.

THE SWIMMING BATH.

By turning to the right, after leaving the Private Baths, a passage leads to the large Tepid Swimming Bath, which was built in 1829, after a design by Mr. Decimus Burton. Its form is an oblong of sixty-two feet by twenty-three feet. On the eastern side are arranged six small dressing rooms, and one large common dressing room. From each of these rooms a flight of steps leads into the bath,

which contains about 37,225 gallons of water, and is four and a half feet deep. The water is supplied from the spring in the King's Bath, and from the cold water reservoir; its temperature is 88° F. The bath is lighted during the day time by windows at the side, and from above, by three lantern domes, with openings to the external air: at night the dressing rooms and the bath are lighted by gas. There is a separate entrance to this bath through the Piazza in Bath Street, opposite St. Catherine's Hospital.

THE NEW ROYAL PRIVATE BATHS.

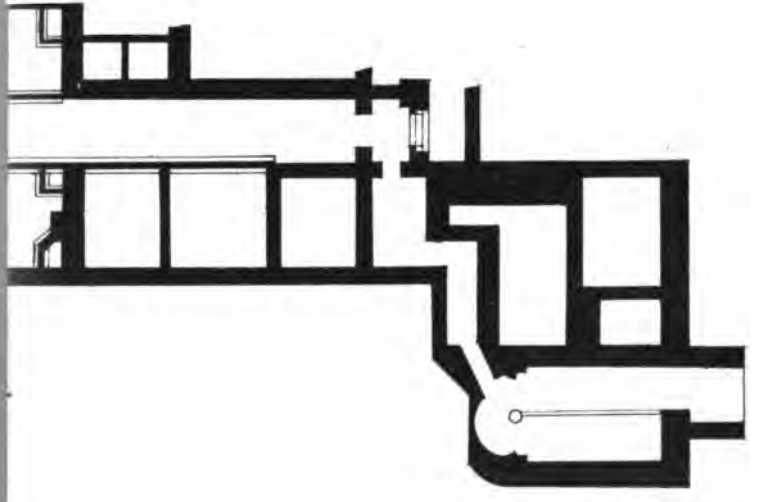
(See Plan.)

The ground plan of these Baths—which are attached to, and form part of, the Grand Pump Room Hotel—is a long parallelogram, divided in the centre by a corridor lighted at the top, with baths and dressing rooms arranged on each side.

There are six bath rooms, each fifteen feet long by eleven feet and a half high. The baths—which in form resemble those of the King's and Queen's Baths—are of a T shape, and measure, in length, 7ft. 2in., and at the broadest part, 10ft., and 4ft. 8in. deep. They are sunk beneath the level of the bath room, are entered by a flight of Sicilian marble steps. The baths are lined, and the floors laid, with buff-coloured glazed tiles.

To each bath room, a dressing room is attached, eight feet wide, eleven feet and a half long, and twelve feet high, with a water closet adjoining.

There are three reclining baths. Each, when filled, contains 150 gallons of mineral water. Dressing rooms and water closets are attached to these baths.



Messrs Wilson & Willcox,
Architects,
Bath.

Added to by Major Davis

There are two dry douche baths, with dressing rooms and water closets attached. There is also an enema apparatus, and a vapour bath.

The swimming bath is at the end of the corridor. It is a grand bath, of enormous capacity, sumptuously appointed, and may fairly challenge comparison with any similar bath in the world. It is lighted from above by means of an open iron and glass roof. Attached to this bath are five dressing rooms, each eight feet square and nine feet high; and one large dressing room, sixteen feet in width and seventeen feet in length. This bath is reserved for the use of females.

There is a communication on the basement with the King's and Queen's Private and Public Baths, by means of a tunnel running under the street, so that there is a ready access to these baths.

There is, also, a communication from the Pump Room Hotel, on the ground floor, with the entrance lobby of these suites of baths, and a lift, by means of which infirm invalids can be brought down from the landings of the Hotel to a level with the corridor, through which, in a merlin chair, an invalid may be wheeled to the baths or douches.

The Hotel and the *suite* of Baths reflect the highest credit upon the architects, Messrs. Wilson and Willcox, by whom they were built in 1870.

DIVISION II.

CHAPTER VI.

"There are more things in heaven and earth, Horatio,
Than are dreamt of in your philosophy."

Shakspere.

THE AIX-LES-BAINS MASSAGE DOUCHE BATHS.[1]

THE main entrance is in Stall Street, through a corridor running from west to east and passing out of the south-western corner of the Grand Pump Room, thence through a short corridor to the left, from which is entered the spacious hall or cooling room of the new Massage Baths. The tesselated pavement is a fac-simile of the floors found in the Roman Baths during the several discoveries, and is of singular artistic beauty. On the east side of the cooling room are the Aix-les-Bains Douches, lofty, elaborately fitted up with various apparati for douching, beautifully tiled, and admirably ventilated.

1 In this Chapter it will be observed that only a passing reference is made to the Bath Thermal Waters as a correlative or subsidiary agent in Massage. But the subject is fully dealt with in the Chapter on "The Mineral Baths of Bath in their varied modes of application."

THE NEW BATH.

Adjoining are the Pulverising and Inhalation rooms, fitted with atomising apparatus for the pulverization of the hot water, and Siegle's Sprays for inhalation, such as are used at Marlioz and at Aix-les-Bains.

The chemical arrangement of the nitrogen and carbonic acid gases contained in the water approximate very closely to the gases at Lippspringe, and provide facilities for the treatment of the early forms ot phthisis, chronic catarrhs of the nose, pharynx, larynx, and bronchial tubes, in much the same manner as they are carried out in Germany, where so much success has been attained in this form of treatment.

On the south and west sides are three Reclining and two Deep Baths, with dressing rooms, a Needle Douche and *Lavement*, fitted up with hot and cold douches, sprays, &c., such as are used at Wildbad and Gastein. There is also a *Bouillon* or combined vapour and douche bath, first for treatment with the natural vapour bath, then for the application of the douche, or *vice versa*, as may be expedient. This is a very favourite method of bathing at Aix-les-Bains, the bather being able to get douches of natural thermal water—hot or cold—with or without massage.

On the basement floor another Aix-les-Bains massage bath, five reclining baths, and another *Berthollet* vapour are in course of erection. New Aix massage douches at the Royal Private and Hotel Baths will also be erected in due course.

Adjoining the King's Bath on the basement floor is the *Berthollet*, or natural vapour bath of the establishment, where the general and local forms of treatment are used.

For a general *Berthollet* the patient enters a wooden box lined with thin zinc, and is then seated on a perforated stool. A valve on the level of the floor is opened and the hot natural vapour of about 112°F. envelops the bather. A round hole, in a moveable frame, is provided for the neck, and the box is then closed, allowing the head only to protrude. The natural steam soon produces profuse perspiration. Soon the body begins to drip, the perspiration continues, and after a period of ten, fifteen, or twenty minutes the patient is released, carefully dried, laid in the cooling-room for a few minutes, or taken off to the hotel. A shower bath—hot or cold—(*Douche Ecossaise)* may be given before the patient leaves the box—if deemed expedient by the medical attendant.

There is also provided the local *Berthollet* or local vapour bath for the arms, legs, or back, with metal tubes adapted for its various uses, fitted up and connected with a drum or metallic cylinder, standing about five feet high, with various valves to increase or decrease the density of the vapour. Ankles, wrists, feet, and fingers, elbows and knees, shoulders and hips, can be locally and independently treated with these various drum tubes. Connected also with the drum is an inhaling tube called at Aix-les-Bains the *Humage*. This is frequently used by the patient for the inhalation of the natural steam from the nearest source.

The temperature of the vapour in the drum and the tubes varies from 110° to 120° Fahr., and the therapeutical value of this apparatus wherever it is used is greatly appreciated.

The apparati for administering the Aix Massage Douche consists of—

(1.) A metal box, called at Aix *Une Botte de Mélange*, which is fixed against the wall, about six

feet from the floor, to receive an admixture of hot and cold water, and connected with it is an india-rubber hose fitted with a rose, which is used for the back, shoulders, and hinder parts of the body. This gives a somewhat gentle force and rarely varies.

(2.) *Une Culotte ou Jumelle,*—with the hot mineral water, through an elastic hose with a bent nozzle, straight from the large cistern above the engine house, carries the water at full pressure on to the legs and front of the body. To finish the douche a second *Culotte* from the same source is placed at the opposite corner of the bath to throw strong jets of tepid or hot water over the body while the patient stands in a corner of the bath grasping a rail.

(3.) *Un Appareil de Grande Chute* (shower bath), with hot or cold water, to descend over the person if desired, is fixed at the same height as the *Mélange*, but with the same pressure as the *Jumelle*.

Usually a manometer is used to regulate the force of the water playing on the person—and this is a matter of considerable importance, to which great attention should be paid.

The floor of the bath is covered with a shallow layer of hot water at 100°, and the temperature of the bath and water used for douching averages from 95° to 105° Fahr.

Each douche chamber, single or double, is fitted up with metal and elastic hose, which can be used at various angles, each with a rose, fine nozzle, spout, &c., so that the hot water can be applied with greater or less force according to circumstances.

Hot, tepid, or cold water, can be obtained at various temperatures, which is regulated by a series of cocks, all water used in the douches being natural thermal water, whether it be cold or of the natural heat.

Vertical and horizontal douches of plain cold water, as well as the natural waters cooled, tepid or hot, can be obtained in the deep and reclining baths as is the case at Wildbad.

The Aix douche must be regarded as a special feature in the bathing establishment at Bath. These baths will compare favourably for size, elegance, and mechanical perfection with any in Europe. The apparati differ somewhat in detail only with those at Aix, the principle of construction being precisely the same; if anything the Bath mechanism is more perfect. The thermal water used for the *Jumelle* is carried over the engine-house from one of the large tanks (containing 22,000 gallons of hot water), in large pipes, through a bridge crossing York Street. This water also supplies the douches; the water used being obtained from the original Roman well found under the King's Bath.

The different kinds of apparati being arranged, the patient is seated on a low wooden stool between the *Botte de Mélange* and the *Jumelle*, and with two *doucheurs;* one of the operators proceeds from behind to use the rose from the *Mélange*, which is directed to the shoulders and back; the other in front directs the hotter water from the *Jumelle* with more force, first over the feet and legs, then over the trunk and arms, on each side alternately, the hands of the *doucheurs* following the action of the water in a rapid way—pressing, kneading, stroking, rolling and thrumming. This constitutes what is known as *Wet Massage.*

Single douches of a less force, with one *doucheuse* only, are arranged for ladies. Then, if required, the *Douche Ecossaise* (or shower) is applied to the back, the patient leaning forward with the hands over the back of a low chair; this being followed by a power-

ful jet of warm or cold water propelled by another *Jumelle* from the further end of the douche chamber.

The process of *Massage* should not last more than from twelve to fifteen minutes, after which the patient passes into a dressing-room of moderate temperature for another fifteen minutes, then the process of cooling is judiciously effected prior to dressing. At Aix the process of drying and rubbing called the *Maillot* is followed, when the patient returns to his or her hotel, goes to bed for a short time, perspires, is rubbed dry, and then gets up refreshed, experiencing in fact a keen sense of renewed vigour and health.

The *doucheurs* and *doucheuses* employed in Bath have acquired their experience in Aix and are highly trained. These Savoyards have been accustomed to the business from early youth and have nothing to learn in their profession. They take a pride in their work, in which they display complete competency and knowledge. Their rapidity, delicate touch, and general manipulation in *Massage* indicate a natural adaptation to their functions, in which it is said they take some kind of hereditary pride. It is worse than useless for an unpractised or unskilled person to attempt the carrying out of *Massage*. At any rate there is a skill and a method peculiar to them most difficult for other persons to acquire.

MASSAGE.[1]

It is proposed to deal with the subject in the following order:—*The Nature of Massage, its History, Modes of Application, Physiological Effects, and Scientific Uses.*

Dr. Douglas Graham,[2] of Boston, Massachusetts, one of the most able exponents of massage of our time, defines massage as signifying a group of manipulative procedures, such as friction, kneading, pressing, rolling, and percussion of the external tissues of the body, used in a variety of ways with curative, palliative, and hygienic results. Its application, in many instances, is combined with passive, and so-called resistive, or assistive movements, known and used in America as the *Swedish Movement Cure.* But from a scientific point of view the word *Massage* may be taken to include all the various forms of manual therapeutics.

Massage was known to Homer and Hippocrates, to the Greeks and Romans, and to many of the Eastern communities before and after the Christian Era, and to this day is practised in the East. Hippocrates wrote of a process of rubbing upwards and *not* downwards, called *Anatripsis*, having a paradoxical meaning, "that which binds closer a joint that is too lax and relaxes a joint that is too rigid."

Asclepiades attributed a soporific effect to gentle stroking, combined with active and passive motion.

1 Μασσειφ ("to knead or handle").

2 A Practical Treatise on Massage.

Celsus recommended rubbing to an invalid whose strength required replenishing.

Galen understood, with scientific accuracy, the mode of holding the hand in its circumflex position when rubbing the fibres of muscles. Moreover there was written a century ago a curious work by John Grosvenor, Professor of Surgery at Oxford, entitled "How to treat contracted joints and lameness from various causes by friction."

Peter Ling, a native of Sweden, instituted the *Swedish Movement Cure*. Within our own times Professor von Mosengeil, of Bonn, and Dr. Mœtzger, of Amsterdam, have used *Massage* as a valuable therapeutic remedy, with such eminent success that their names are familiar to the scientific world.

To Dr. Weir Mitchell, of Philadelphia, however, much is owing for his mode of treatment, of which *Massage* is the conspicuous part. It is called the *Weir Mitchell Massage Method of Treatment;* and has been so successfully practised by Dr. Playfair in this country that it will be spoken of in detail in a future chapter. It is interesting also to note that the *Lomi-Lomi* of the Sandwich Islanders is probably a species of *Massage*.

Massage, as an art, is *not*, as it has been described, hand-rubbing, all-round-friction, or shampooing. Besides strength, which is indispensable, no little skill is required. It is a powerful agent in scientific hands, and requires some knowledge of anatomy. Friction, however, is only a small part of *Massage*, which comprehends the whole system of manual therapeutics. But there are various modes of procedure. In France and Germany *Massage* comprises *Effleurage*, *Pétrissage*, *Tapotement*, and *Massage à Friction*. In America *Massage* is classified under

the head of *Friction*, *Percussion*, *Pressure*, and *Movement*. The expressive term *malaxation* (the "kneading to softness") is commonly used in that country.

Effleurage (from "effleurer, to skim over lightly") is a stroking movement, made with the tips of the fingers and the palm of the hand; it may be done softly and gently, or with considerable force. This form of *Massage* is suited to the superficial circulation of the body, especially influencing the veins and lymphatics, working from the extremities towards the trunk along the fibres of the muscles, and always in the direction of the returning circulation. *Beuster*, of Berlin, speaking of *Effleurage*, suggests slow gentle strokes in a centripetal direction, along the course of the veins and lymphatics; these should be made with the palm of the hand, with the pressure intermitting, so as to cause passive peristaltic action. Dr. Stretch Dowse[1], of London, demonstrates that the finger and thumb should be fully extended, the tips slowly and lightly drawn along the surface and returning in an opposite direction with the palm of the hand, the hands being always kept on the patient's body, the wrists rotating like a pivot. The upward movements should be the more energetic, the tips of the fingers and outer side of the thumb being used in one direction, the knuckles and palm in the other. *Massage* of this kind has the effect of inducing *sleep of a tranquil nature* rather than a mere state of repose. Friction is commonly used with *Effleurage*.

Pétrissage (from "pétrir, to knead"). This form of manipulation in a patient by whom it can be borne produces marked effects; the essential virtues being produced by punching, pressing, and squeezing. A portion of the soft tissues are grasped, firmly pressed,

1 On Massage.

and rolled under the fingers, the hands moving in opposite directions; then the soft parts are squeezed, and the skin goes with the hands, which are moved regularly from below upwards. Dr. Stretch Dowse pinches up the skin with thumb and fingers, rolling it, and if a large mass of muscle, grips it firmly and works upwards. It is useful as stimulating the flow towards the centre of the circulation, and especially for the deeper parts of the body.

Tapotement (from "*tapoter*, to pat, to tap"), used for the muscles of the back, is a percussing, thrumming, or hammering; a tapping with the hand closed. It is a stimulant to the hard rolls of skin, cellular tissue, and muscles of the back and the neck. The process of kneading, percussing, and thumping being most effectually carried out on a graduated scale.

American Massage.—The elaborate work of Dr. Graham is grouped under four heads. It may be stated that nothing was more impressive as to its value and efficiency than his work during the writer's sojourn in the United States. The doctor's method of applying *Massage* is here described. The four heads are *Friction*, *Percussion*, *Pressure* and *Movement*. Malaxation is a combination of the last two, and to some extent resembles *Pétrissage*, differing only in respect of the flat of the hand being applied with more or less strength before bringing the fingers together to exercise the *Pétrissage* (Maguire).

(1.) Commence manipulations moderately (single or combined) graduating in force and frequency, the operation then diminishing to its original moderation and ending with *Effleurage*.

(2.) Adapt as much of the palm of the hand as possible to the surface worked upon, so that time and labour may be saved.

(3.) The manipulator should be close enough to the patient to concentrate his operations.

(4.) The patient should be in an easy position, with joints midway between flexion and extension, and in a temperature of 65° F.

(5.) The amount of *Massage* must be calculated by the forces and rapidity of movements used, length of time employed, and the obvious effect produced on the patient. A great deal will depend, therefore, on the artistic capabilities of the manipulator.

(6.) The direction of the work must be from the extremities to the trunk, along the fibres of the muscles, from origin to insertion, and in the direction of the circulatory currents.

Friction, pure and simple, may be regarded as circular and rectilinear; the latter may be vertical or parallel to the long axis of a limb; or it may be horizontal, transverse, or at right angles to the long axis. Transverse friction is never employed. Dr. Graham remarks that a slight deviation from the method usually employed for doing straight-line friction has been found useful for almost every case —the upward strokes of friction being made stronger, the downward movement lightly grazing the surface imparting a soothing influence without being so vigorous as to retard the circulation pushed along by the upward stroke—thus saving time and effort.

The administration of *Friction* is as follows:— The hand is used, starting from the ends of the fingers to the wrist, which measures the length of each stroke; the returning stroke should be light, the hand not being removed. The rapidity of double strokes may be from 90 to 100 to the minute. The whole palm surface of the fingers is employed, and in such a way that the fingers will fit into the

temporary depressions formed by the phalanges and metacarpal bones of the hands—the patient's hand meanwhile resting on the other hand of the manipulator. The palm should be well rubbed by pushing the heel of the hand down and working it in a semi-circle. A similar process should be done with the sole of the foot.

The right hand of the operator should be used for the right hand and foot of the patient, and the left for the left. From the wrist to the elbow, and from the elbow to the shoulder, are suitable parts to be masséed—straight line with circular friction in such cases should be used; both hands for the latter moving together obliquely, one ascending as the other descends, each stroke reaching from joint to joint. The skin should not be chafed, and with both hands the movements should average 150 to the minute. These strokes should begin on the inside of both arms and legs so that the superficial and deep vessels may be first acted upon. Friction on the foot is done with the hands at right angles with it, one being on the dorsum and the other on the sole, each moving alternately in a circular manner, one ascending the other descending. Around and behind the ankles a pushing stroke is made with the fingers, the operator thus of necessity changing his position so as to face the patient.

The lower limbs being larger than the upper, the lateral portions from ankle to knee will form a good tract. This should be done with the knees semi-flexed—the operator standing facing the patient for the posterior and lateral aspects. Having completed the friction without stopping the strokes, the *masseuse* will turn with her back to the female patient and continue the stroking on the anterior and lateral aspects—each thumb following the other

with tolerably firm pressure over the front layer of the muscles of the leg.

In friction on the thigh the operator's back will be turned to the patient. Below the knees the number of strokes should be about 160 with each hand, and above from 60 to 100 to the minute. For downward and outward semi-circular friction the back of the head to the spine of the blade bone is also a convenient tract, and from the blade bone spine to the crest of the pelvis and sacral bone forms another surface over which one hand can sweep while the other works over the muscles of the buttocks—at from 60 to 75 to the minute. The strokes on the back and thigh should be slower and stronger, the skin being thicker and less sensitive. The process on the chest should be done from the centre of the sternal bone towards the shoulders horizontally; the abdomen from the right groin in the horse shoe direction of the colon from right to left, friction in this region, however, being seldom necessary. Friction is chiefly intended to act on the skin, the deeper tissues requiring massage.

The advantages of ordinary rubbing, whilst it must *not* be despised, is the least important part of true massage, which has acquired a far more extended range of influence. *Massage* proper is *manipulation, deep-rubbing, kneading* and *malaxation.*

Massage, therefore, requires an expert adaptation of the fingers and hands to the various parts, working the tissues beneath in a rotatory way by a sort of kneading, rolling, squeezing process from the extremities to the trunk. The same sub-division of surface, however, is desirable for friction and will be found most convenient. Moreover, the fingers should not be allowed to slip on the skin.

The operator's thumb will be placed on one of the fingers of the patient and parallel to it, and on the opposite surface the second phalanx of the index finger will be at the same time placed at right angles to it; and between the two the finger of the patient will be compressed and malaxated from 75 to 100 to the minute. If possible both hands should be used, each finger and thumb in turn going over the hand and wrist; finally the palm of the hand should be done by the stretching of the tissues vigorously apart. Each part included in a single grasp may receive three or four manipulations, after which the operator proceeds to the adjacent region, the advance upon which should allow the finger and thumb to overlap one half of what has been already worked upon. Advancement and recession should be systematically carried on—a principle of almost general application to all the other tissues that can be masséed. The force employed must be graduated so as to allow the patient's tissues to glide freely upon each other; if too great the tissues will be bruised; if too light the operator's fingers will slip; whilst to glide with very strong compression will chafe the skin.

Again, the feet in like manner with the hands, the fingers must work between the metacarpal bones. Both hands can be better used on the large surfaces of arms and legs; each hand at the same time being placed on a group of muscles separately, opposite to each other. Where the circumference of the limb admits one hand should be in advance of the other so that two groups of muscles may be done at the same time by grasping, circulatory, and spiral manipulations, one hand contracting as the other relaxes. The hands must be well kept apart to obviate interference with the circulation; then the hands

must be slightly raised, and, in advancing, gently and agreeably stretching the tissues. Avoid stretching the tissues in opposite directions at the same time, more especially over the joints where the skin is delicate and thin. In every process it is well to go over the surface gently before beginning more thoroughly in detail. The two hands will embrace the arms with the thumbs in median line. The gastrocnœmii muscles should be malaxated with the grasp of one hand.

Masséeing above the Elbow.—This is the most common situation for massage. One hand should seize and squeeze the biceps, while the other takes the triceps. The middle portion of the deltoid muscle requires close attention from the thumbs placed parallel to its fibres, the palms and fingers being engaged with the anterior and posterior aspects of the muscle. The whole muscle requires strong working and the shoulder joints will probably demand circular friction.

Masséeing the Leg.—Below the knee three divisions are followed; the outside along the peroneal muscles over the fibula—the front of the leg over the shin—and posteriorly over the muscles. Rolling and stretching the tissues away from the bone, and from each other, and insinuating the points of the thumb between the muscular fibres. If the limb be small it can be done at once with two hands.

Masséeing above the Knee.—The adductors should be grasped on the inner side ot the thigh with one hand, while the other embraces the large extensional front, alternately relaxing and contracting the hands so as to stretch those bulky muscles away from the line of the femoral artery. The rate of these manœuvres vary from 80 to 100 per minute, each hand being

on the arms; 60 to 90 on the legs; and 40 to 80 on the thighs, where much force is required to extend the strong fascia.

Masséeing the Back.—The direction should be from the nape of the neck downwards with sweeping curves—the patient lying on one side while the reverse side is being done—stretching the tissues away from the spinal column, and, if much force be necessary, one hand being placed on the other, the operator working them circularly with great force. Dr. Graham significantly points out that the position of the shoulder blades is important, for if the upper arm be parallel with the side, then the posterior border of the shoulder blade will be too near the spinal column, and there will be no room for working upon the muscles between scapula and spine, and if the upper arm be stretched forward at full length the superficial muscles between the spine and the scapula will be so tense that those beneath cannot be reached; the arm, therefore, should be placed *midway* between those positions.

Masséeing the Chest and Abdomen.—Procedure in this case is similar to that in friction already described, the difference being that the manipulations must be more gentle than those on the back and limbs, the tissues not bearing the same vigorous movements. Moderate pressure and movements with the palms rolling and grasping the skin and superficial structures, whilst on the abdomen firm deep kneading along the ascending, transverse, and descending colon, the heel of the hand on the side of the abdomen next the operator, being used; at the same time, on the opposite side, the strongest efforts with the fingers are required. For constipation this process is necessary, but to be effectual the

operator may find it expedient to go over the ground, along the horse-shoe curve of the colon, again and again. The operator should work from the wrists, concentrating his strength in the muscles of the hands and forearms, instead of fixing the muscles of the upper arms and shoulders. All awkward and unnecessary movements and too firm a compression of the patient's tissues should be avoided. Dr. Fothergill remarks that the muscles, and still more their representatives in the motor area of the brain hemispheres, require long and diligent training before high class manual skill can be acquired.

Masséeing of the Head.—The operator should stand or sit behind the patient, placing both hands on opposite sides of the head, compressing to an agreeable extent, and endeavouring to effect some rotatory movement of the scalp. This must be followed by effleurage along the course of the arteries of the scalp, loosening the hands from time to time. One hand should be placed on the forehead, the other at the base of the head, and then compressed as before. Intermit pressure at short intervals, the objective result being a suppleness of the scalp. Massage in these cases induces sleep and relieves headache.

Percussion.—This is a process which must be carefully used. It is applicable over large muscles, and is done in several ways—with the ulnar borders of the hands and fingers; with the ends of the fingers, the tips being level with the palms of the hands; with the palms held in a concave manner, so as to compress the air while percussing; the wrist, be it observed, having all the time free play. The blows should be springy, dealt smartly and transversely to the muscles, as well as on the back, which is a special tract. The hands should be at right angles to it, the patient bending forwards.

The Movement Cure.—In America this is very prevalent in cases of muscular contraction. There are certain *resistive movements*, or efforts, which the patient makes whilst the operator resists. A group of muscles being voluntarily contracted, the operator in the contest extends them. Brown Séquard points out that when a group of enfeebled muscles are exercised, if they are first contracted to the utmost, it would require much greater force to overcome the contraction than could be accomplished by natural effort in passing from relaxation to contraction. Alternately to resist flexion and extension is the difficulty of operators. Then there are vigorous passive movements, as used by bone-setters, when endeavouring to break up adhesions in and about joints. Midway between resistive and passive movements in the course of certain recoveries stand *Assistive Movements;* these, however, are but little used, and need not be further dwelt upon. Gymnastics and calisthenics do not legitimately belong to the subject of massage.

Many kinds and forms of instruments have been used for massage, for instance, the *strigel*, *roulette*, the *sponge*, *palette*, etc. The strigel used by the Romans was made of gold, silver, or gilt bronze; in India it is usually made of ebony. The palette is used by the Germans, and was recommended by Galen. The roulette is an instrument of four or eight little wheels made of boxwood, which revolve in a handle; but practically it is proved that no instrument can compete with the human hand.

PHYSIOLOGICAL EFFECTS & SCIENTIFIC USES OF MASSAGE.

What are the functional effects of massage? It will now be shown what it does on the skin and fascia; what its effect is on the muscles, on the blood vessels, nerves, lymphatics, lymph spaces, and lacteals; and, further, what it does remedially for physical deformities.

Massage supplements the action of the heart and the pulse, and greatly relieves blood pressure. It is an important aid to the tendons and capillary circulation, and it mechanically helps to separate fibres, cells, and membranes which adhere from disease; helps to break down adhesions of semi-anchylosed joints, sheaths of thickened tendons, and adherent fibres of connective tissue; and it rouses the skin to increased action. Moreover, massage induces, and probably increases, oxidation of the tissues, as to which, although there are great differences, yet there are also strong analogies existing between massage and certain kinds of exercise. Massage, therefore, in many aspects, is the mechanical equivalent to muscular activity.

When the physiological processes of the body become imperfect ill health surely ensues, commonly followed by chronic gout. This, for the most part, is attributable to a diminution of waste products, which should be eliminated from the body, such as urea, carbonic acid, vapor of water, salts and water. The retention of these products in the system, moreover,

may be looked upon as sub-oxides producing disorders of local organs and an aberration of local processes. The normal products of metamorphosed waste tissues, therefore, are urea, carbonic acid, water, and salines.

The Skin.—By reason of being so highly organised the skin receives and transmits the results of massage. The epidermis limits evaporation, prevents absorption, reduces the evolution of heat, and is mechanically a protection to its deeper layer. The nerve centres receive all their external impressions from it, and the nerve terminals register all morbid action at their origin in the central nervous system. The capillary circulation, being so near the surface, is influenced to a greater extent than the lymphatics, and the effect of effleurage on the skin affects the sensorium agreeably, and the anæsthetic effect of pinching the skin in pétrissage is equally well known. It is, moreover, the principal seat of all tactile sensation. Massage has the effect of soothing and of inducing agreeable soporific results, when wisely and properly administered through its nervous mechanisms. The thermic sensibility of the skin, however, does not correspond to the tactile localities, and the *æsthesiometer* of *Liegeois* has shown that it is best marked in the cheeks, eyelids, tip of tongue, and external auditory meatus. On the trunk the sensibility diminishes as the median line is approached, whilst that of the surface diminishes from below upwards. The abdomen, again, is more sensitive to change of temperature than the back. On the limbs it increases as the process reaches the trunk, arm, and thigh; whilst the extension aspect is more sensitive than that of flexion. In the forearm and leg the reverse is the case. Further, sensibility is diminished by cold, by heat, and by

thickness of epidermis. It should here be remarked, however, that the localisation of thermic sensations is less strongly defined than tactile sensibility. The intensity of thermic sensations much depends on temperature and conduction, and is modified by the extent of surface engaged. For example, water apparently is hotter or colder when the whole hand is submerged than when only a finger is dipped in.

The thermic sensibility of the mucous membrane is much less than that of the skin. Some parts, such as the stomach, or intestinal canal, possess none.[1]

In thermal bathing these points are worth remembering, and may be of some practical use to bathers of certain temperatures in relation to certain localities.

The amount of carbonic acid thrown off by the skin of an average man in twenty-four hours amounts to ten grammes, increasing with a rise of temperature, largely augmented, of course, by bodily exercise and by massage. The function also of the superficial fascia in facilitating the movement of the skin over the deeper structures is influenced much by massage. In a tough, thickened state of the skin, as in the horse, a sort of hide-bound condition, indicating a poverty of the general nutrition, another effect may be produced by massage, namely, the liberation of the superficial vessels and nerves by absorption, which soon produces a marked improvement. The mode of massage in this case is to grasp the skin, moving and stretching it, which quickly effects the object desired.

The Muscles.—In action the muscles, by their intermittent compression and relaxation, produce a

1 Mapother's Physiology, by Knott.

kind of massage on each other. The diaphragm acts in this way on the organs above and below it, except when tight lacing nullifies its action. Michael Foster[1] speaks of the muscles as the master tissues of the body, all the functions of the body depending chiefly on their regular use; there are also the thermogenic tissues. The coursing of the blood through the capillaries, the lymph through the lymphatics and lymph-spaces of the body, the function of breathing, action of heart, and so forth, depend greatly on their activity. The voluntary muscles contain a quarter of the total amount of the blood in the body, and their action resembles that of a beating heart, for at every contraction of a muscle the blood is driven out of it, and by the same action it at the same time receives an additional impulse in its return to the heart, while at every relaxation the vessels are again allowed to fill.

The heart, it has been said, usually lasts a life-time without fatigue, and is always in action, while the voluntary muscles of inaction suffer in size and strength; for, as Dr. Weir Mitchell suggests, "their circulation goes around rather than through them." A muscle loaded with effete materials is in a state of fatigue,—contracts with less energy and with diminished velocity, and soon ceases to contract at all; but if allowed to remain inactive, a loaded muscle does *not* become fatigued, and in this way is explained the presence of lithæmia in gouty persons.

Persons who take exercise, feed well, and maintain the organic functions of their bodies, need no general massage, beyond what is necessary for stiffened joints and limbs. Want of exercise is relieved by massage, which promotes a more rapid absorption of tissue waste, obviating so much weari-

1 Treatise on Physiology.

ness by stimulating the peripheral circulation. Exercise diminishes the blood pressure, and accelerates the circulation; massage diminishes blood pressure, but does not increase the action of the heart, indeed it is rather lessened in force. The vaso-motor system is influenced by massage, which stimulates the muscular nerves, redness of the skin following, for example; and more blood is seen to pass through masséed parts in a given time. It is rational, therefore, to conclude that there must be increased tissue metamorphosis, and the comfort experienced after massage, doubtless, arises from the presence of natural worn-out *débris* being speedily removed from terminal nerve filaments. In breathing, too, the free respiration due to the air cells being stretched by deep inspiration, increased carbonic acid is thrown off, oxygen is absorbed, and all the other nerves of respiration are influenced thereby. The local flow of blood in a given part depends largely on the mechanism produced by the muscles on the blood vessels flowing in such part, independently of the action of the heart and the arteries. But this mechanism depends also on healthy muscular tissue—tissue *not* loaded with depurative materials, incapable of contracting, relaxing, and eliminating through its fibres, and indirectly influencing the regular manifestations of nervous activity so essential to health. Muscle cells in activity change their shape, becoming shorter and wider. Single cells do not contract, but rather change their volume, whilst the fibrillæ contract, and their ends approach each other, together with the surrounding connective tissue. Massage also has an analagous effect on these tissues. The contraction of muscular tissue, Michael Foster[1] says, is, in fact, "a limited and definite amœboid movement, in which intensity and rapidity are gained at the expense of variety."

1 Physiology.

The effects of massage and active exercise are alike in most respects, but massage is not only a substitute for exercise as some people would have it, *i.e.*, voluntary exercise, but it means exercise of the nervous system as well as of the muscular. Massage is especially applicable to the overtaxed brain and exhausted nervous energy, whereas exercise alone would only increase the trouble, thus showing that some mechanical stimulus of the nutritive functions is required. Fatigue shows that waste is greater than repair. Muscular fatigue, from whatever cause, is relieved by massage, and fatigue by mental toil is relieved by the same means. Irritability of muscle is also diminished by massage. Dr. Graham has shown that muscles give a much more vigorous response to the will and to the Faradaic current after massage than they did before.

In massage muscular contraction is imitated by the hands, and helps to propel the contents of the venous radicles towards the centre of the circulation. With effleurage the nails recover colour; cutaneous veins show prominently under the skin, and the pinkish hue of the limbs generally returns with improved superficial circulation. In absolute rest Dr. Weir Mitchell points out how much good is done by stimulating the secretions of the skin, how the skin is flushed as in ordinary exercise, and how flabby muscles become in time firm by this process, the alternate gripping and loosening of the hands and fingers squeezing out the blood and lymph, thus accelerating their upward flow.[1] The same writer (as previously explained) also remarks that massage and electricity certainly increase the tissue metamorphosis by stimulating the interstitial circulation.

1 Dr. Weir Mitchell on Fat and Blood, page 170.

In massage results are somewhat incomplete, as they do *not* alter the total elimination of the entire day, but cause a large and abrupt increase within three hours, followed by a compensatory decline. It is assumed, however, from the best sources, that severe exercise does not eliminate nitrogenous waste as was once thought, but rather that carbonic acid only is largely increased in its elimination by muscular labour, which is found to increase five-fold the quantity given off within one hour. Michael Foster concludes that all exertion tends to throw off carbonic acid only, nitrogenous elements being retained in the muscle. Massage probably will be found in the future the most perfect means to deal with these superfluous accumulations. It has been found over and over again that fatigued muscles are easily tetanised by the smallest irritation, and on testing the influence of massage on them, the result came out that the irritability was diminished by massage in a marked degree.

The deep fascia surrounding the four hundred muscles of the body make up the great lymph spaces. It surrounds the tendons, connects muscular and ligamentous fibres, forms sheaths round the blood vessels and nerves. Lymph spaces exist everywhere, and are in every case influenced by massage of some kind, the spaces in the fascia explaining the very satisfactory results of massage on the lymphatic system. Deep massage is known to empty the vessels of a limb, as within eight or ten minutes the effect on the calf of the leg will show a decrease of a quarter of an inch in its circumference.[1] It must be admitted that massage rouses dormant capillaries, increases the area and speed of the circulation, furthers absorption, and stimulates probably the vaso-motor nerves, all of which are material aids

1 Graham on Massage.

to the circulation and to general nutrition. Seeing, moreover, that more blood passes through masséed regions in a given time, there must be an increase in the interchange between the blood and the tissues, and a manifestly accelerated condition of the circulation proper.

Howath has shown biologically that bacteria introduced into human living arteries produced *no* apparent effect, but that in animals that die from bacteria poisoning the bacteria were found for the most part in the lymphatics and never in the large arteries. This is from a scientific point of view most valuable, massage being found suitable for the treatment of germ diseases. The capacity of the veins is double that of the arteries, which are supplemented by the lymphatics; but the circulation languishes without the action of the voluntary muscles. Here massage steps in and by upward and oval friction with deep manipulations the veins and lymphatics are emptied, the glands are pushed along by the *vis a tergo* of the massage, and the valves of the vessels prevent their return. The collateral circulation of the deeper vessels is aided, as well as the capillaries and arterioles.

The Nervous System.—Massage has a tonic and sedative effect on the nervous system, and it is the best preventive to cold in the open air. The central nervous system receives and reflects the results of massage. The relief of headache by masséeing the back and shoulders is certain, whilst strong pétrissage and tapotement of the limbs often produce sleep—this is reflex. Massage has the same effect on the vessels of the nerves as it has upon those of muscles; and, as in the case of muscles, improved nutrition with improved functions follow.

Patients whose maladies condemn them to habits of inertia are afflicted with an over abundance of sensory phenomena—or excessive nervousness—in such cases massage should be adopted to preserve the natural irritability and use of the muscles, thus allowing the motor nerves to give expression to the citations. It may be predicated that fewer cases will be relegated to the eternal couch when the remedy is more generally known and applied. But there are others, says Dr. Graham, whose overtaxed motor, sensory, and intellectual powers need absolute rest, and to be allowed recuperation before the systematic employment of massage.

According to the molecular theory the beneficial effects of massage are brought about by molecular changes in the nerves, muscles and tissues generally, by which the chemical combinations forming the basis of the body are favoured, the separation and elimination of others hastened, and greater activity and better equilibrium of the vital forces promoted. This is markedly seen in respiration and in the diminution of blood pressure; and it is also seen in the diminished action of the heart by massage, and the undoubted sympathy shown by the vaso-motor centre. Further, the muscular sense is pretty well awakened by massage, the state of the muscles usually indicating the sensations of health and vigour, or of those of weariness and feebleness.

Massage, as a mode of treatment in surgery, was used by Larrey (Napoleon's body surgeon) on his return from the East, and he tried to reduce all its varied forms into a harmonious system. Many distinguished authors in England, America and Germany, in more recent times, have written upon massage in various forms of disease; and amongst others, Dr. Weir Mitchell, of Philadelphia, as applied

in cases of Fat and Blood, Neurasthenia, and the Anæmia of women: Jackson on Diseases of the Uterus; Fardel in its effects on the Liver; Busch on its effects in Intussuception; Cowles and Page on its uses in cases of Insanity. In England, Dr. Playfair has written on Massage, its use in Nerve Prostration and Hysteria. The late Dr. Hilton Fagge, Dr. Lauder Brunton, and Dr. Gamgee on its uses in Intestinal Obstruction and Chronic Dyspepsia. Billroth, in Germany, has shown the use of massage in injuries of the joints, sprains and contusions. Space admits only of the practicability of pointing out the various forms of disease chiefly influenced for good by massage.

It is proposed, therefore, to speak first of the surgical cases, such as sprains and contusions, synovial affections and injuries to joints, as to which massage is especially applicable. Billroth,[1] after showing massage to have been a process used by the Hindoos and Grecians, speaking of injured and distorted joints, says that "they should at first be lightly and gradually rubbed with increasing pressure from below upwards toward the body, so that the fingers being applied below the injured joint are carried up to the next joint, as if pressing a fluid from the periphery toward the centre of the circulation." And, as demonstrating the power of massage, it has been shown by Mosengeil that Indian-ink injected into the knee of a rabbit may be made to enter the lymphatic vessels and lymph spaces of the connective tissue of the thigh within a few minutes. The same holds true of pathological products, blood extravasations, etc. "There is no doubt," he adds, "tha by massage rapid absorption of blood may be induced, and inflammatory swelling, although the pain

1 Surgical Pathology and Therapeutics.

at first is severe, soon disappears through the process of massage. The resolvent effects are most decided in the four or six hours after the injury. Later, when there is acute inflammatory swelling present, it should be applied with more reserve, but when the acute inflammatory swelling has passed it may be tried more energetically." Massage is very useful in getting rid of old infiltrations in distorted joints, but it must in such cases be used with great energy and perseverance. It sometimes induces speedy suppuration and the case goes on to one of acute abscess, or the chronic inflammatory products are rendered fluid and absorbed by the excited blood and lymph circulation (Billroth). Under massage, too, thickenings dependent on true inflammatory neoplasia may rapidly disappear. Coagulated fibrine, as seen in chronic inflammation of the nerve sheaths, may be re-absorbed. Besides its local effect massage may stimulate the kidneys to increased secretion and thus cause absorption of aedema even when its cause cannot be cured.

Chronic Synovitis.—Massage applied energetically is an excellent remedy, preferable, in some respects (Billroth says) to compression. It induces a rapid sero-fibrinous inflammation, with general increase of the blood and lymph circulation, inducing absorption of the fluid in the joint. Massage and compression may be combined if desirable.

In Contusions about the head, if masséed within the first twenty-four hours rapid absorption of blood and serum is induced; if mild massage be introduced it will produce suppleness of the scalp. Eventually the process becomes most agreeable, and a health-sleep is induced, general comfort, clear ideas, and, when present, general relief of congested deep parts. From ten to fifteen minutes will be found sufficient to produce these effects.

Agnew, in his "Principles of Surgery," says massage has its place, and often no secondary one, in medicine and surgery. "It is proper," he says, "in cold, rough, flabby conditions of the skin, indicating imperfect innervation and a defective capillary circulation—a condition often present in the convalescence of low fevers—in paralysis not due to central disease, in preventing atrophy of the disabled muscles, in constipation, in insomnia—where other means have failed, in club foot, in sprains, in relaxation and rigidity of joints, in inflammatory indurations and adhesions about the articulations, and in the subcutaneous muscular and tendonous tissues especially after fractures." It is, however, generally conceded that massage should be used very cautiously in acute stages of disease, or immediately after certain grave injuries. The best time to begin, usually, is after the inflammation has passed its zenith, but there are certain exceptions to this rule, as, for example, in sprains, etc. If the manipulations be followed by swelling, tenderness, increased heat and pain, the process has probably been applied prematurely. The masseur must proceed gently, and operate only for a few minutes at first, until the temper of the region is fully ascertained.

Movements.—Active and passive movements have a recognised therapeutic value in certain surgical affections, namely, in the prevention of stiffness or anchylosis, true or false, in joints; the restoration of the articulations which have been sprained; the absorption of the fluid after acute inflammatory condition of the joints has subsided; the development and strengthening of wasted and unused muscles; the breaking down tendonous adhesions. Passive movements are necessary in the treatment of fractures, and also in false anchylosis following disloca-

tions. Much can be done by patient and frequent movements of the joint by moderate power; and in old cases of synovitis, after too long a rest has taken place, motion is required to produce absorption of the fluid. When motion is applied to joints to develope the muscles, the operator, when instructing the patient to flex or extend his joints, uses his own strength to resist the movement, and thus calls into action the flexors and extensors of the articulation. These trainings require judgment, and should never be carried to exhaustion, or even so as to produce weakness and the danger of atrophy of the muscles, by too heavily forcing the nerve supply. Sometimes painful conditions of nerves, especially the sciatic, due to adhesions with the surrounding tissues, are relieved by forcible extension or flexion (Graham).

Sprains.—In all degrees of severe sprains the average length of time for recovery has been calculated at nine days, compared with the ordinary modes of treatment of twenty-six days, or nearly three times as long as in cases treated by massage. Massage has been used more successfully in cases of chronic joint affections and in cases of recent sprains than in any other similar cases. The famous surgeon, the late John Hilton, of Guy's Hospital, pointed out how massage especially influenced the nervous supply in most of the joints, showing at the same time that the same trunks of nerves whose branches supply the groups of muscles which move a joint provide also an arrangement of nerves to the skin over the insertion of the muscles, and that the interior of the joint receives its nerves from the same source. This means harmonious action of the various co-operating structures. In cases of cramp massage is valuable, if the tissues involved can be

masséed. It has been already pointed out that tender, inflamed, puffy joints do *not* admit of massage, but the healthy surrounding tissues can be treated with effleurage, which soothes. But it must be remembered that in some of these cases light massage is disagreeable, whilst firm pressure affords comfort. In sprains, massage relieves pain by removing pressure from terminal nerve-ends, reduces heat of the part affected, accelerating absorption, and lessening tension. After massage to the injured parts a firm bandage should be applied. In cases of much capsular thickening and induration about the joints, effleurage and pétrissage are effective; and, instead of bandaging, motion of an active character should be used. It is always desirable in sprained joints to use massage, the impaired tendons and adhesions within and without the sheaths of tendons being probably broken down or loosened. As a preliminary proceeding in cases of this kind a warm bath is desirable. In chronic cases deep kneading is the rule. In cases of joint-trouble it should be observed that the smallest results are given in cases with *no* objective symptoms. In some neuralgias massage is found beneficial; and in all cases of chronic synovitis, involving capsule and surrounding cellular tissue, a great deal of massage is necessary to produce the slightest objective results.

In acute arthritis and disease of the bone or cartilage, massage is useless. Estradère, however, remarks that, although massage should be avoided in inflammation, it is not so with reference to sprains, and in such cases the sooner manipulation is employed after the injury the sooner recovery follows. By this remedy, in fact, earlier use of joints and more rapid relief from pain and swelling

ensues than by any other method of treatment. Berghman reports 145 cases of effusion into joint, contusions, and distortions, of which 70 cases averaged 6 days with 12 sittings, while 38 cases of old sprains required 22 days and 44 sittings. "Never in these cases," he says, "apply a plaster of Paris dressing, as the connective tissue proliferates and acquires a troublesome indurated condition." The general results given by Gerst, Wagner, Zabludowsky, Norstrōm, and others support this special treatment of sprains in their early acute stage.

Massage is most effective in rupture of the Plantaris Muscle; in cases of Dupuytren's contraction of the fingers, after tenotomy, and wasted muscles after injury of the nerves, as in dislocation of the shoulder joint, etc. But it must be borne in mind that massage is always more serviceable in preventing contractions, stiffness, and anchylosis, than in curing them.

Pagenstecher published his first experience in massage on the eye in 1878. More recently he has confirmed that experience, and he speaks of it as being useful in asthenopia, hypermetropia, myopia, and astigmatism, when glasses fail. In hyperœmia of the retina and twitching of the eye-lids the orbit should be masséed and the orbicularus muscle stretched. In cases of corneitis, opacities, and localised ciliary inflammation, much good has resulted. *Schenkl* has confirmed *Pagenstecher's* experience. *Donders*, at the Ophthalmological Congress in London in 1872, also spoke highly of massage in abscess of the cornea.

Rheumatic Gout (Rheumatoid Arthritis—Arthritis Deformans).—Whatever its origin, nervous or inflammatory, its course is so well known that it

needs no comment ; but the immobile joints and those limited in their action suffer earliest and most, and become permanently stiffened ; the tendons flatten out ; the muscles undergo fatty degeneration ; bones anchylose, and massage then is useless. These, however, are extreme cases. In the early stage massage and passive motion will do much. *Zabludowsky* has reported recoveries in some cases, but the treatment must be adopted early, and in such cases patients recover sufficiently to be capable of resuming their occupations. Massage may be used on the soft structures over and around the affected parts—it acts on their nutrition, and accelerates interchange of materials, owing to the speed of the circulation over the area being increased, and obstructed small vessels made permeable ; the nodosities and deformities, however, if hard, cannot be recovered. Rest stiffens the joints, and the disease spreads symmetrically. In Heberden's nodosities massage must begin early, carried out assidiously twice or thrice a day, and old tendonous adhesions broken down. The disease is usually associated with climacteric change and prolonged uterine disturbances in women.

Muscular Rheumatism.—By this term is meant acute muscular rheumatism occurring in the rheumatic or rheumatoid patient ; sudden sprain or rupture of muscular fibres by injury ; catching cold and excessive fatigue, as seen in lumbago—all well-known causation factors. These, when it can be borne, can be well treated by massage. It acts by pressing out the pent-up fluid, and promoting absorption of exudation, and thus removing mechanical stasis. It is capable of relaxing and loosening adhesions of a painful character resulting from spasmodic contraction. Massage is needed in

chronic cases when induration of connective and fibrillated tissues occur, with consequent atrophy of muscles, and impeded locomotion long and protracted. In Bath, in such cases, marvellous results are attained if the courage and perseverance of the patient second the doctor's orders. The tactile feeling of the soft parts are nodular, tough, and wiry, like whipcord, and this produces pressure on the cutaneous nerves and their sheaths. Nutrition is improved by persistent massage continued for a lengthened period.

Stiff Neck and Wry Neck.—In these cases, even if acutely paroxysmal, massage can be employed in conjunction with warmth and rest. A friend of the author's, Dr. George S. Bull, of New York City Hospital, has reported the result of massage in cases of ruptured fibres of the muscles at the back of the neck, accompanied by exquisite localised tenderness and spasm, as having been highly successful, and compares favourably with other therapeutic means. In thirty-three cases of spontaneous and of traumatic origin treated with massage by Dr. Johnson, eighteen recovered, fourteen improved, whilst in a single case there was no favourable result. It has, moreover, been pointed out that after complete rupture of muscles and tendons massage and movements educate the remaining fibres to supplement the loss of the injured ones. Referring again to Dupuytren's contraction of fingers, Dr. Lewis Sayre, of New York, has attained most excellent results solely from massage. Dr. Herbert Page, of Carlisle, has treated a popliteal aneurism successfully by massage. The late Sir W. Ferguson, by pressure with his thumb in a right subclavian aneurism, forced fibrin into the artery by squeezing and rubbing the opposed

surfaces together. Druitt mentions a similar case. In cases of elephantiasis little is known of its effect in this country. In America, however, Dr. Douglas Graham[1] has much to say of all cases, several of which were greatly relieved and the œdema reduced. The œdema and superbundance of callus met with in certain fractures, such as the clavicle, can be removed and materially lessened by massage, and in the case of limbs, muscles may be restored to use, especially when passive and active movements are vigorously carried out.

Scrivener's Palsy and Allied Affections.—Massage in these affections is singularly useful and successful in the hands of such adepts in the art as Dr. Graham, of Boston. He tabulates a large number of allied cases, such as sewing, knitting, watch-making, pianoforte, harp, and violin performers, each and all of which tend to produce similar disorders. In telegraphy, painting, shoemaking, also, giving rise to tremor, spasm, pain in hyperæsthesia, or anæsthesia or electric thrills from lightning, etc., he makes similar records. Nor must reference be forgotten in this category to manipulators' and dancers' cramp. In these cases Faradisation and massage work well together—massage corrects under-action and over-action of muscles, nerves, and nerve-centres. Malnutrition in the co-ordinating machinery of the central nervous system is regarded as the origin of scrivener's, or writer's cramp, and such allied maladies.

Peripheral Paralysis.—Dr. Wagner speaks most highly of massage in its application to this affection. In ordinary cases of facial paralysis arising from cold without any cerebral affection, specific or otherwise, selected massage (with occasional Faradisation) is used with admirable effect.

1 Graham on Massage.

Paralysis of the Muscles of the Fore-arm.—In these cases, especially after surgical operations where no divisions of the leading trunk-nerves has taken place, massage is hopefully used. The author himself removed from a female (a patient at the Royal United Hospital, Bath), aged sixty, thiryt fibroid tumours of the fore-arm. No division of the trunk nerves took place, but damage was done during the enucleation to the branches running between the fibrous septa of the extensor muscles. Paralysis of the extensors ensued; in three months, however, with steady massage, the limb had perfectly recovered, and the patient, a cook, resumed her employment, and has remained permanently well.

Paralysis of the Deltoid Muscle.—When this occurs after dislocation or injury, massage (with Faradisation) is more useful than drugs, especially if atrophy, due to pressure on the circumflex nerve supplying it, be present.

Infantile Paralysis (Poliomyelitis Anterior Acuta). —It has been pointed out that club foot, extensive cases of spinal curvature, and loose-hanging limbs, arise from this cause. In such cases a warm bath should be given, followed by deep pétrissage and friction; and if there be no movements passive motion should be adopted. Sometimes the cultivation of movement in opponent groups of muscles may be productive of benefit. Massage of intact healthy muscles may stimulate the nutrition of neighbouring impaired muscles. In these cases it is well that the patients should be compelled to help themselves as far as possible.

Dr. Murrell,[1] in this country, has done much by massage in cases of *infantile paralysis*. The Faradaic current induces diminished excitability of the nerves,

1 Dr. Murrell on Massage.

and after Faradisation of the nerves they yield no response to galvanism; but when the current is placed over the muscles themselves increased excitability ensues, whilst in health a feebler current produces contraction. By systematic massage improvement is often effected. Deep pétrissage, working upwards, with frequent *short* sittings, at first produces warmth; then muscular contraction under galvanism ensues in a short time, and with a month's treatment happy results are obtained. Electricity is always here a valuable adjunct, and Dr. Murrell points out in his original work that it should be especially applied in cases of this type. In chronic paralysis progress is always slow.

Hysterical Paralysis.—In these cases massage is the great therapeutic remedy, which may be persevered in without intermission. It may be said also that all modes of massage should vary with the condition of the patient.

Chronic Mylitis.—In these affections sometimes massage may be used with startling effect. But in all cases it should be used by an experienced and accomplished masseur.

Progressive Paralysis.—Dr. Weir Mitchell remarks that the first case of the kind he saw was operated upon by a charlatan, using it in various forms of special disease with signal benefit.

Landy's Paralysis (Paralysis Ascendente Acuta).—Massage in these cases is comforting, but does not effect permanent good.

Locomotor Ataxia.—Cases are benefited by a course of massage from time to time. It improves the tone of the muscles, and sometimes relieves the lightning pains down the limbs, as well as the girdle pains. Whether specific or not massage is recom-

mended by the best authorities. Schreiber used massage assiduously with good results, and Türk proved that slight anæsthesia was got rid of by rubbing alone.

Dr. Mortimer Granville[1] says, in commencing sclerosis of the cord, with loss of tendon reflex, the application of the percussion instrument over the spinous processes of the appropriate vertebræ produces remarkable effects. In some cases locomotor ataxy has been removed or sensibly ameliorated, and the general improvement was considerable.

Disseminating Sclerosis of the Cord.—Clarke has shown that in such cases his patients did better under massage than without it, while most authorities agree that in progressive muscular atrophy exercise and massage are highly beneficial, although in cases of the degeneration of the nerve cells of the spinal cord, it seems scarcely reasonable to use exercise. In vascular degeneration of the cerebral arteries, and in atheroma of the arteries generally, massage is useless.

Chorea (St. Vitus's Dance).—In this affection the most encouraging results have been obtained. Dr. Phillips[2] and Goodhart have pointed out the value of massage, rest, and free nourishment, which have proved more satisfactory than any other form of treatment. Laisne, however, used massage many years before in a large number of cases with great results and without any cases ending in paralysis; but the most perfect results are without doubt obtainable by massage in connection with the use of the Bath mineral waters. This treatment will receive further notice under the head of *Chorea*. It is difficult to conceive that in grave organic lesions of the brain and spinal cord, massage can do more than divert

1 On Nerve Vibration and Excitation.
2 *Lancet*, August 5th, 1882.

the over-abundant supply of blood to those central organs and relieve the pains due to local congestion.

Lead Paralysis, with dropped wrists or with the premonitory muscular weakness in limbs.—Nothing in such cases can be more useful than massage, especially when combined with the Bath thermal waters, and the use of the *Berthollet* natural vapour bath. The blue line along the margin of the gums will disappear, *pari passu*, with absorption of the waters and by perseverance with special massage.

Neuralgia, Neurasthenia, and Anæmia of Women.—Brown Séquard has enumerated several affections of the eyes that may give rise to supra and infraorbital neuralgia. Those persons who suffer from migraine and from neuralgic affections of the great and lesser occipital nerves at the back of the neck, and acute pain from functional disorders of the fifth cranial nerve, experience signal benefits from the use of scientific massage. In hyperæsthesia effleurage affords prompt relief of the scalp after mental distress.

Spinal Tenderness.—When this affection resembles organic spinal mischief, massage does great good. Mr. Teale, of Leeds, has shown that irritation of the lower portions of the cervical spinal cord gives rise to morbid exaggerations of the nerves of the arms, shoulders, and superficial portions of the chest. These pains are of an erratic character, sometimes shooting down the arms and chest, and resembling angina-pectoris; at other times over the chest walls and breasts. Palpitation, nausea, and sickness are sometimes present, together with many other symptoms, which, if not diagnosed correctly, may give rise to considerable anxiety. Counter irritants, blisters and so forth may be applied, but careful and diligent massage is the potent agency

to relieve these morbid phenomena and to accomplish what drugs usually fail to do. The sleeplessness usually accompanying such cases, where chloral and all the drug armamentarium have been used in vain, will yield to massage of the spine and of the abdomen in the most obstinate cases. Nothing is so grateful after general massage as the quiet doze which in most cases follows. Insomnia from mental distress, chronic dyspepsia, intestinal catarrh yielding to the same or similar remedies affords most gratifying results.

No work on massage would be complete without mention being made of the system known as the *Weir Mitchell Method* in the cure of neurasthenia anæmia in women as well as in general starvation of the tissues. Massage is not only in such cases a valuable auxiliary, but in the skilful hands of Dr. Weir Mitchell, of Philadelphia, it has achieved the highest and most remarkable results. His system consists of enforced rest, quiet seclusion, generous feeding, frequent massage, and occasional electricity. Many a broken down and apparently hopeless invalid, after a long protracted bed and couch existence, has been built up by his system. Frequent applications of scientific massage have soothed and comforted to sleep, regenerated tissues, cured aches and pains, and awakened muscular sense.

In England, Dr. Playfair has been the pioneer of this form of treatment and with much gratifying success. It is pointed out, moreover, that the worst cases of nerve prostration and hysteria are to be found on this side of the Atlantic. The neurasthenic and anæmic condition of women requiring this form of treatment is most painful to witness and difficult to reach with drugs. Massage in these cases, however, requires to be done not too rapidly,

the patient frequently resisting the impression involuntarily. Percussion manipulation, deep kneading, and electricity of a mixed kind, such as Faradisation with slow interruptions of an inductive current, are needed to make marked impressions of progress, the mental condition of the patient often struggling to oppose the operation, thus nullifying results. A clear head and a determined will are needed to push the patient along, to supply, as Dr. Graham says, the missing link between will and action. Dr. Playfair, in reference to his own observation in this practice, says he has had more satisfactory and surprising results than he has ever before witnessed in any branch of his professional experience.

Again as an example of the Weir Mitchell system, especially as to diet, the daily allowance adopted is: —6 a.m., ten ounces of raw meat soup; 7 a.m., cup of black coffee; 8 a.m,, a plate of oatmeal porridge, a gill of cream, a boiled egg, three slices of bread and butter, with cocoa; 11 a.m., ten ounces of milk; 2 p.m., half a pound of rump steak, potatoes, cauliflower, a savoury omelette, and ten ounces of milk; 4 p.m., ten ounces of milk, three slices of bread and butter; 6 p.m., a cup of gravy soup; 8 p.m., a fried sole, three large slices of roast mutton, French beans, potatoes, stewed fruit with cream, and ten ounces of milk; 11 p.m., ten ounces of raw meat soup.

Uterine Diseases.—Massage in these diseases has been successfully used by the best workers in America and Europe. Its uses also in amenorrhæa and dysmenorrhœa, in functional disorders of the catamenia, ovarian neuralgias, chronic fibroid enlargement of the uterus, and sympathetic meteorism, have been strikingly exemplified. Massage of the uterus internally has not been tried. On other

internal organs, however, such as chronic enlargement of the liver, atony of the stomach and bowels, intestinal and fœcal obstructions and nephralgia, it accomplishes what drugs fail to do; and, without it, a large number of these cases would in all probability fail to obtain relief. Dr. Treves, in his new work on *Intestinal Obstruction*, cites a case of fœcal obstruction of Martin's. A patient, aged seventy-eight, had severe obstruction, due probably to impaction in the terminal part of the ileum of a large gall stone. Aperients had failed, vomiting became stercoraceous, a tumour was detected in the right iliac fossæ. On the sixth day massage was employed, relief followed, and on the next day a large gall stone and ten smaller stones were evacuated.

Constipation.—Pétrissage, tapotement, deep pressure and kneading, with circular friction over the belly from right to left, give results of the most satisfactory character.

Massage, as a means of treatment in *chronic dyspepsia*, gouty or otherwise, and in sleeplessness, has been lately dealt with very ably by Dr. S. Eccles, in the *Lancet* of September 3rd, 1887; and he goes to show what methodical massage will do in cases of chronic gastritis and intestinal catarrh. Many patients, he states, whose sufferings have been but slightly relieved by other means, have yielded to massage, which he regards as a therapeutic agent of great value when rightly used and skilfully applied in these cases. In certain stages of the syphilides, in the convalescence from acute and chronic disease, massage improves the anæmia and obviates general mal-nutrition, which is always present. In the persistent anæmia of indolent persons, who refuse to walk or to regulate their bodily animal functions, massage well and determinedly administered rarely fails to do good.

In cases known as *nervous or cerebral spinal exhaustion* massage requires to be most discriminately administered, but when the right line is found it works admirably. There are various types, as pointed out by Dr. Graham.[1] The man or woman played out by worry, overwork, or any other cause which produces fatigue, which is not recuperated by natural causes; the nervous, high-tension, business man, always wakeful, anxious, and on the *qui vive;* the neurasthenics without occupation; the spoiled children of nature—those who, in fact, have become chronic invalids, with numberless symptoms—all are types of patients whose symptoms point to cerebrospinal exhaustion. Massage in all such cases will be of marked benefit as a tonic, sedative, and corrective of morbid sensations. In the irregular manifestations of gout, so ably described by Dr. Robson Roose[2] in his work on *Gout*, special massage may be discriminatingly used with beneficial results.

1 Graham on Massage.

2 Gout, and its relation to Diseases of the Liver and Kidneys, Fifth edition; 1888.

CHAPTER VII.

"Science is certainty—is truth found out."
Abraham Coles.

THE SPRINGS, ETC.

The three Springs which supply the Corporation Pump Rooms and Baths are situated in the lower part of the town; and probably derive their origin from one common source, the main stream from which does not seem to be far distant from the several points at which they appear above ground. The Spring, however, which formerly supplied the Kingston Baths, flows in a distinct channel, inasmuch as it was unaffected by the accidental tapping, in 1836, of the common course of the water which flows into the Corporation Baths.[1]

1 This proves to be erroneous, as is shown elsewhere in the volume. These Baths, which have been called, at different times, the Abbey Baths, and Old Roman Baths, were situated on the southern side of the Abbey, in the rear of Kingston Buildings. The Baths formerly attached to the Abbey House were supplied with mineral water from the King's Bath spring; but when that building was destroyed in 1755, and the Roman Baths discovered, the spring which supplied the latter was found at the same time, and now supplies the Kingston Baths. These baths (the first private baths established in the city) were erected by the Duke of Kingston; they were commenced in 1763 or 1764, and completed in 1766, and were afterwards the property of his heir in the female line, Earl Manvers. They are no longer used as Thermal Water Baths, although when originally established, being covered in and thus rendered more private, they were superior to all the other baths in that respect. They were at different times occupied by the late Doctors Wilkinson and Spry. They form no longer a part of the bathing establishment, and are mentioned here because of the historic interest attaching to them. They are also referred to in connection with the discovery of Roman Antiquities in 1755.

As the geological character of the locality where mineral springs are found is a subject of interest, it may be well to give a general sketch of the disposition of the strata found in Bath and its immediate neighbourhood.[1] The limestone of which the town is built is obtained from the beds of Great Oolite, quarried on Claverton and Combe Downs. Beneath this stratum is Fuller's earth, which appears on the northern side of the city, and on it the houses of Mount Beacon and Richmond Hill are erected. Under this is the Inferior Oolite, upon which rest Lansdown Grove, Lansdown Crescent, and its two wings. Winifred House and Sion Place also rest upon it. The declivity in front of Lansdown Crescent consists of Inferior Oolitic sand, upon the lower limit of which All Saints' Chapel is built. The continuation of this declivity, on which Park Street and Cavendish Place are erected, consists of Marlstone, which also forms the upper portion of the High Common and part of Sion Hill. The remaining part of Bath, on the right side of the river Avon, is built upon Lias. The larger portion of Bathwick, the Parades, Green Park Buildings, and Norfolk Crescent, are upon Alluvial soil. In ascending the high ground upon the eastern and southern parts of the city, the Lias and Inferior Oolite Sands are crossed, until we gain the highest point, when we reach the beds of Great Oolite on the Claverton Downs and behind Prior Park. Below the Lias are found the Upper Red Sandstones and Marls, and beneath these the Coal Measures.

It is not improbable that the Hot Springs find their way through fissures or dislocations in the latter, and the fact that particles of coal are found among the sand thrown up by them, tends to give

1 See Guidott.

support to this impression. They have also forced their way through the Upper Red Sandstones, Marls, and Lias. Hot springs frequently occur near the line of junction of two geological formations, and those of Bath arise near the junction of the Lias with the Upper Oolite.[1] It has been shown that water from the Lower Lias, and coal-measures in the County of Somerset, contains an abundance of chloride of sodium, amounting to 1,008 grains per gallon. And parenthetically it may be remarked that sulphur waters usually co-exist with thermal springs. One hundred, or more, years ago, a cold sulphurated-water spring is known to have existed in Lyncombe Vale; but it has disappeared.[2] There is, indeed, reason to suppose that sulphurated wells still exist in the neighbourhood, which have long fallen into disuse and been forgotten.

At the Middle Park Hot Springs in Grand County, Colorado, U.S.A., is found a thermal alkaline water with a temperature of 116° Fah., rich in carbonates, which flows from a mountain plateau at the rate of 200 gallons per minute. On the other side of the

1 Vide Sir Chas. Lyell's Inaugural Address at the Meeting of the British Association held at Bath in 1864.

See "The Hedgemead Landslip," by Charles Moore, F.G.S., in "Proceedings of the Bath Natural History and Antiquarian Field Club." Vol. iv., No. 3, p. 249, 1880.

2 Great preparations were made with the view of utilizing this spring, which was discovered in the valley. The house, now known as *Lyncombe House*, was built as an establishment for patients whose disorders were likely to be cured by these cold sulphur waters. The spring, however, disappeared as suddenly as it appeared. Warner says, in reference to this and other similar springs, which appeared about the same time:—"As this stratum of marl throws out the lower set of springs, it is probable the pyrites, and ochre-balls contained in it may occasion the mineral waters of Lyncombe, Middle-hill, and others in the neighbourhood of Bath; under this marl is dug the blue and white lyas, a calcareous stone with a mixture of clay which resists the frost but imperfectly, yet is found to be the best material for pitching and mending the roads and for burning to that brown lime which forms the best cement under water.

adjacent river a cold sulphur spring has been recently found. At Dax, in France, the Aquæ Augustæ Tarbellicæ of the Romans, there is a cold spring on one hill, and a thermal saline spring on the other. Sir Charles Lyell expresses his belief that the Bath springs, as in the case of many other mineral waters,[1] mark the site of some great volcanic convulsion and fracture of the earth's crust at some not very remote period, geologically speaking. The uppermost part of the rent through which the hot water rises being situated in horizontal strata—Lias and Trias—300 feet thick. This may be more modern than the lower part which passes through the inclined and broken strata of the subjacent coal measures which are unconformable to the Trias. The nature and succession of these rocks, penetrated by the Bath waters, was first made out by the late William Smith (a land surveyor of Bath), in 1817, when a shaft was sunk in the vicinity in search of coal.

The late Charles Moore thought it probable the heat of the waters was due to progressive chemical changes. The Rev. H. H. Winwood thought it came from the subterranean heat of the interior, as the fissure through which the stream ascends appears to be in the Palæozoic Rocks. Blend these two statements and probably the real explanation will be arrived at.

The temperature of the water of all the Springs appears to have been unvarying, except on three occasions, which will be hereafter noticed. Compared with other Thermal Springs frequented for medicinal purposes they rank high.

1 A summary of Sir Charles Lyell's theory of causation is given, not necessarily because the writer agrees with it, but as the opinions of one of the most eminent geologists of this or any other country. That opinion differs in some essential points from the majority of writers on the subject.

CHIEF THERMAL SPRINGS OF ENGLAND.

	Fahr.
Bath—Cross Bath	104
King's Bath	117
Hot Bath	120
Buxton	82

CHIEF THERMAL SPRINGS OF FRANCE.

Aix-les-Bains—Sulphur and Alum	110—114
Amélie-les-Bains (Pyrénées)—Sulphur & Saline	71—172
Bagnères-de-Bigorre (Hautes Pyrénées)—Sulphurous, Arsenical, and Chalybeate ...	72—120
Bains-les-Bains (Vosges)—Glauber Salt ...	70—115
Barèges (Haute Pyrénées)—Sulphur and Saline	86—111
Bourboule (La), Puy de Dôme—Saline, Effervescent, Arsenical	140
Bourbonne-les-Bains (Haute Marne)—Bromo-Iodine Waters ... ... 119—138—180	
Bagnols-les-Bains (Lozère)—Glauber Salt ...	50—105
Bagnères-de-Luchon (Haute Garonne)—Sulphur Water	63—132
Cauterets (Hautes Pyrénées)—Sulphur Saline	102
Chaudes-Aigues (Cantal)—Alkaline, Iron, Arsenic, and Sulphur	135—195
Dax (near Pau)—Brine and Sulphur; also Mud Baths	120—145
Eaux-Bonnes (Basses Pyrénées)—Sulphur and Saline	90
Luxeuil (Haute Saône)—Indifferent Thermal	65—133
Mont-Dore (Puy de Dôme)—Chalybeate, Effervescent, Alkaline	107—115
Néris (Allier)—Indifferent Thermal... ...	114—125
Nitrogen Gas ... 88·62 } 100·00 Carbonic Acid Gas ... 11·48 }	
Plombières (Vosges)—Indifferent Thermal...	175
Chalybeate also	30
Prest (La), (Department of Pyrénées Orientales)—Indifferent Thermal	90—105

Royat (Puy de Dôme) — Resembles Ems; Muriated Alkaline	68— 96
St. Gervais (Savoy)—Sulphur	50—120
St. Honoré (Nièvre)—Sulphur	82
Salins-Moutiers (Savoy) — Chalybeate; very rich in Chloride of Sodium	87
Vichy (Auvergne Mountains)—Pure Alkaline:	
Grand-grille	106
De l'Hôpital	87— 88
Célestins	59
Puits Chomel	109

CHIEF THERMAL SPRINGS OF GERMANY.

Aix-la-Chapelle—Sulphur	132
Burtscheid—Sulphur	142
Mühlenbad Quelle—The hottest spring in Germany	176
Baden-Baden—Mild Muriated Saline ...	156
Ems (Nassau)—Saline, Alkaline, Earthy; the only Thermal Soda Water containing much Common Salt:—	65—110
Kaiserbrunnen	84
Kranchen	96
Kesselbrunnen	114
Babenquelle (Special Ladies' Douche)	96
Lippspringe (Westphalia) — Lime-sulphated, Earthy, Indifferent Thermal	82
Munster-Am-Stein (near Kreuznach)—Bromo-Iodine Waters	86
Neuenahr (Rhenish Prussia)—Alkaline ...	72—104
Schlangenbad (Hesse-Nassau) — Indifferent Waters)	85— 92
Warmbad (Saxony)—Indifferent Waters ...	85
Warmbrunn (Silesia) — Sulphur, Indifferent Waters	90—100
Wiesbaden (Taunus) Kochbrunnen—Muriated Saline	153
Wildbad (Wurtemberg)—Indifferent Waters...	80— 95

Thermal Soolbader of Germany, or the Saline Baths rich in Carbonic Acid :—

Bertrich—Alkaline and Glauber Salt... ...	90
Nauheim (near Homburg), with its	
Friedrich Wilhelm Sprudel ...	96
Grosser Sprudel...	89
Rehme-Oeynhausen	89

CHIEF THERMAL SPRINGS OF AUSTRIA.

Baden (Vienna)—Saline and Sulphur ...	82— 95
Carlsbad—Glauber Salt Spring, consisting of—	
Sprudel	162
Hygeia-Quelle	162
Marktbrunnen	111
Mühlbrunnen	129
Schlossbrunnen	129
For Special Drinking :—	
Felsenquelle	140
Elisabethquelle	109
For Ordinary Drinking :—	
Sprudel	
Schlossbrunnen	
Marktbrunnen	
Mühlbrunnen	
For Bathing :—	
The Kurhausquelle	149

(Marienbad and Franzensbad are Cold Springs.)

Darnvar (Slavonia)—Alkaline Waters ...	100—115
Gastein (Salzburg District)—Indifferent Thermal	75—118
Harkanzi (Hungary)—Alkaline and Sulphur ...	130
Ischl (Upper Austria)—Saline and Sulphur ...	86
Johannisbad (Bohemia)—Indifferent Thermal .	96—118
Mehadia (Hungary)—Alkaline, Saline, Sulphur Water	86—131
Neuhaus (Carpathian Mountains) — Saline, Thermal	95
Romerbad (Styria)—Indifferent Thermal ...	97—102
Teplitz (Bohemia)—Indifferent Thermal ...	98—119
Tüffer (Styria)—Indifferent Thermal ...	100
Töplitz (Croatia)—Lime-sulphated Spring ...	100—115

(The Therma Jassæ of the Romans.)

Tobeldad (Styria) – Indifferent Thermal ..	80

CHIEF THERMAL SPRINGS OF SWITZERLAND.

Baden (Aargau)—Alkaline, Sulphur... ...	119
Louèche-les-Bains (Canton Wallis) — Earthy waters, closely resembling the Bath Waters as to solid constituents and temperature :—	124
Nitrogen ... 93·4	
Carbonic Gas ... 5·1	
Pfäffers (St. Gall)—Indifferent Thermal ...	90
Schinznach (Aargau)—Sulphur and Muriated Saline	95
Weissenburg (Canton Berne)—Lime-sulphated Waters	75— 78

CHIEF THERMAL SPRINGS OF ITALY.

Acqui	100—167
Bagno-in-Romagna (Florence) — Sulphur and Carbonic Acid	108—110
Battaglia (near Padua)—Saline	160
Bormio (Upper Italy)—Earthy Water ...	104
Chianciano (Tuscany)—Sulphur	100
Ischia (Bay of Naples)—Alkaline and Saline ...	145
Lucca (Tuscany)—Lime-sulphated Waters ...	125
Nerone (near Pozzuoli)—Alkaline Water ...	170

CHIEF THERMAL SPRINGS OF SPAIN.

Archena (Province of Murcia)—Saline and Sulphur	124
Arnedillo (Province of Logroño)—Saline ...	128
Buzot (Province of Alicante)—Epsom Salts Water	100
Lanjarron (Province of Grenada)—Alkaline, like Vichy	80
Panticosa	79— 92

CHIEF THERMAL SPRINGS OF ALGIERS.

Hammam-Meskutin — Lime-sulphated and Arsenical	203
Hammam-Melouan—Saline	103
Hammam-R'Irha — Lime-sulphated and Iron (famous for Phthisis, Chronic Bronchitis, Gout, and Rheumatism	133

CHIEF THERMAL SPRING OF EGYPT.

Helwan-les-Bains (near Cairo)—Sulphur Waters	110

CHIEF THERMAL SPRINGS OF JAMAICA

Milk River Spring—Lime and Glauber Salt ...	92
Hot Sulphur Bath Spring—Sulphur... ...	120

CHIEF THERMAL SPRINGS OF AMERICA.[1]

El Paso de Robles, San Luis, Obispo County, California—Hot Sulphur Springs; mostly valuable in Specific Disease, and resembling Aix-la-Chapelle	100
Near the Santa Lucia Mountains there is a Thermal, Saline, Sulphur Water, with Natural Mud Baths, at	140
Calistoga Hot Springs, Napa County, California —Hot Sulphur and Steam Baths; also Moor, or Mineral-Mud Baths, like Franzensbad and Marienbad; Grape-cure, as at Vevey, in Switzerland	100—150
Hot Geysers in Sonoma County, California :—	
Alum and Iron Spring	97
Alum and Sulphur	150
Boiling Black Sulphur	195
Middle Park Springs, Grand County, Colorado —Sulphur	110—116
Hot Springs of Virginia, Bath County— Sulphur	102—110
Hot Springs of Salt Lake City, Utah—A Thermal Sulphur Water, containing much solid matter, more than any known European Sulphur Water	120

1 Made out chiefly during the Pacific Government Explorations.

Indifferent Thermal Springs of America are—

Hot Springs of Arkansas—Resembles Gastein and Pfäffers	93—130
Idaho Hot Springs, Clear Creek County, Colorado—Resembling Carlsbad ...	85—115
Warm Springs, Madison County, North Carolina—Resembles Luek, in Switzerland; Lime and Sulphur	102
Merrewether, County Georgia—Lime-sulphated Water; resembling Bath in solid constituents	90
Lebanon Springs, Colombia County, New York —Like the Sweet Springs of Virginia ...	73
Warm Spring of Bath County, Virginia — Like the Serpent Bath of Schlangenbad, in Nassau; a soft, velvety, unctuous feel of waters, due to Silicates; resembles Wildbad	96— 98
Healing Springs of Bath County, Virginia— Lime-sulphated; like Schlangenbad in temperature; rich in coufervoid growths—a soft, green, silken moss—valuable and highly prized	85— 88
Sharon Springs, Schoharie County, New York, and so famous in America, are Sulphur and Chalybeate, with only a temperature of ... and are practically cold.	48
Puebla Hot Spring, Humboldt County, Nevada —Dr. Blake speaks of this as the Diatomed Spring, the ground around being composed of Infusorial Earth, of great microscopic beauty.	

The temperature of the Springs[1] has been represented as arising from the action of a volcano beneath the city: but, on the one hand, the presence of thermal springs is by no means always connected with volcanic agency; and on the other, the geological features of the district indicate a tranquil disposition of the materials constituting the several strata,

1 In Dr. Julius Braun's work, "The Handbook to the Spas of Europe," which was edited by Dr. Hermann Weber, a note added by this physician, at p. 170, says:—"Bath, elevation about 100

while the separation between the upper stratum of the high land of the valley is more properly to be ascribed to denudation than the throes of a

---

feet above sea level, the temperature of the hottest spring being 117° Fah." the fact being that the hottest spring is 120°.

☞ The temperature of the springs as recorded by the several writers on them certainly differ. The differences, however, may depend on the character of the instruments used, on the time they were exposed to the action of the spring, and to the absence of self-registering thermometers. The more recent observations are more trustworthy than those of an earlier time.

"These waters are hot, of a bluish colour and strong scent, and send forth their vapours. Of which there are four hot baths, each with stone seats, for the conveniency of such as use the waters. One triangular and called the Cross Bath, from a cross that stood formerly in the midst of it. 'Tis about 25 foot long, and as broad at one end; the heat of it gentler than the rest, because it has fewer springs. Another is the Hot Bath, formerly the hottest of all, when it was not so large as now it is. The other two are the King's and Queen's Baths, divided only by a wall, the last having no spring in it, but receiving the water from the King's Bath, which is about 60 foot square, and has in the middle of it many hot springs, that make its heat the greater. Each of these two baths has a pump, to pump water upon the diseased, where strong embrocations are required. Famous were these waters among the ancient Romans, and Bath a place of so great antiquity, that where the Cathedral now stands 'tis said there was a Temple consecrated to Minerva, the Goddess of Fountains and Baths." *The New State of England.* Part ii., p. 106. The copy from which the above extract was taken had no title page. From internal evidence its date appears to be 1703.

At p. 181 of the same work this statement occurs:—"In England the representative of the hot indifferent thermal springs is Bath, which enjoyed great reputation in former times but is now rather neglected. The neglect has arisen from various causes. When most frequented the Continent was closed to the English, the recoveries were attributed to the 'company' who frequented the springs and frequency of amusements in Bath, and E. O. tables. But now these things were accredited to the waters where the excitement of unchecked gambling gave an impetus to the action of the waters, 'specially its action on the kidneys! The visitors come to Bath in September and June—they do not limit their visits to November and April. It has springs varying from 104° to 120° Fahr., resembling in their constituents the Leuk springs. From its mild and equable climate, and from the frequency of gout in England, Bath is the English Teplitz, which is deserving of credit as to the temperature of the Bath Waters."

volcano, at a time probably when the valley formed part of an estuary, the waters of which debouched in the direction of Weston-super-Mare, over a tract of country now known as the Zoylands (i.e., sea-lands), while the fissures and dislocations of the lower strata, through which the mineral waters reach the surface, may be attributed to disturbing causes acting from a distance.

The temperature of the Bath waters varies from 104 to 120 Fahr., in the different springs; this is exceptionally high when due allowance is made for the great distance of Bath from the nearest region of active or recently extinct volcanoes, and of violent earthquakes. The temperature of the springs of Aix-la-Chapelle is 132 Fahr., but they are within forty miles of those cones and lava streams of the Eifel, which, though they may have spent their forces ages before the earliest records of history, belong nevertheless to the most modern geological period. Bath is about 400 miles distant from that part of Germany, and 440 from Auvergne, another volcanic region, the latest empties of which are geologically coeval with those of the Eifel. It is further to be observed that the great volumes and high temperature of the Bath waters render them not only unique in the country, but perhaps without a parallel in Europe, when their distance from the nearest region of violent earthquakes, or of active or extinct volcanoes is taken into consideration.[1] For example, in recent historical times earthquakes have

1 Geike observes that "warm springs occur at a distance from any active volcano. Those of Bath, for example, in the lowlands of the south-west of England, are more than 1,000 miles from the burning mountains of Iceland on the one hand, and more than 1,100 from Vesuvius on the other. . . . It may often be noticed that hot springs rise along mountain chains, or at least on lines where the rocks have been intensely crumpled, and where they may have been greatly heated during the crumpling.

been violent enough to disturb the subterranean drainage and change the shape of the fissures through which the waters ascend. During the earthquake at Lisbon, in 1755, the temperature of the spring—La Source de la Reine—at Bagnères de Luchon, in the Pyrenees, was suddenly raised as much as 75° Fahr., or, in other words, changed from a cold to a hot spring of 122° Fahr., a heat which it has since retained. It is also recorded that in 1660 the hot springs at Bagnères de Bigorre, in the same mountain-chain, became suddenly cold during a great earthquake, which destroyed the town. Since then, however, the normal heat has gradually returned. At Colmars, in France, a hot spring was known to flow, intermittently, every 7 minutes; after the Lisbon earthquake in 1755, it lost this peculiarity, but after the earthquake of 1763[1], its normal state returned. The waters of Teplitz, in Bohemia, moreover, after the latter event, assumed a reddish yellow appearance, which lasted for a couple of hours, and the springs at Clifton, during the Lisbon shock, assumed a tinted hue. During the earthquake of 1690, the waters of Gastein became clay white.

The quantity of water supplied by the Bath Springs appears to have been unaffected since they first became subjects of investigation, up to the present time, by any meteorological change. They are, as an old writer has said, "Perennial springs, whose water is neither increased by the greatest glut of rain, nor lessened by the greatest drought," but the present supply could not, in the modern methods of obtaining it, have supplied the enormous quantity of water used by the Romans here for all their

1 Sir Charles Lyell's Inaugural Address, British Association, Bath Meeting, 1864.

Thermæ, even approximately. The Romans built on their springs whenever practicable. The quality, however, of the thermal water has never varied, so far as known experience suggests. The constancy of their flow into the Baths has been thrice interrupted: once by the sinking of a shaft in search of coal, in the neighbourhood of Batheaston, towards the east; again, in 1811, when an escape of water took place from the Springs, rendering it necessary to "puddle" the ground through which they rise; and more recently, in 1835, the supply was affected by the digging of a well 170 feet deep, at a distance, on the west, of 250 yards from the King's and Queen's Baths, and 200 yards from the Hot and Cross Baths. The stream of hot water burst into and overflowed the well, and the supply to all the Baths, except the Kingston Baths, was materially diminished, as was also the temperature of the water; the latter circumstance may be accounted for by the water in the Baths cooling more rapidly when but slowly supplied to them. The stream, however, was with some difficulty restored to its natural channel, and the Baths now fill with the usual rapidity.

In small quantities, when recently drawn from the Spring, the water is clear, colourless, and sparkling; in large quantities it presents a pale sea-green tint. It is free from any odour, and possesses a pungent, slightly saline, and somewhat chalybeate or inky taste, and though perhaps a little distasteful at first, the invalid with whom it agrees, in a short time, comes to relish and even to desire it.

In the time of Guidott physical science was little understood, but it would seem that he was in advance of his age, and although his opinions were

crude, yet they are worth quoting, especially as they were in reply to the arguments of Baynard :—

"Although I am of opinion, that many considerable effects are produc'd by heat, without assension or flame, yet that some hot waters do owe the origin of their heat to an actual fire, where eruptions are visible, I never deny'd; and the neighbouring heat of Vesuvius and Ætna, continually burning mountains, to the hot baths in Italy and Sicily, give, I grant, a sufficient demonstration of the cause of heat of those waters, and others of like circumstance, from an actual fire. But what he means by that which follows, and by parity of reason, we may guess, that the same cause gives the like heat to baths of colder climates, though the actual fire be not so visible there, I know not; and judge it as weakly asserted, as what I find in another place, that there is the same depression of the earth into a deep valley at Buxton, which appears at Bath; and that contrivance, he conceives, was absolutely necessary to come nearer the central fire, for the boiling of the water. The author mention'd before, in his Thermæ Britannicæ, c. 8, hath spent much time, and many arguments, to evince the non-existence of that chimerical notion, of an actual fire kindled, and continually burning in the bowels of the earth, without eruption, and hath there considered this central fire, more especially in relation to an hypothesis of the like nature of Athanasius Kircher, in his Mundus Subterraneus; where, contrary to what he would have to advance this opinion, the center of the earth is represented, according to the old philosophy, dense, pure and elementary earth, cold and dry, and so in direct opposition to fire and water; to which I shall here add, to make appear how inconsiderable the parity of reason is, that the small distance from

the top of an hill to the bottom should be so necessary a contrivance, by the wisdom of the Creator, to set the pot so much nearer the fire for a more speedy and effectual heat; to set this, I say, in its due light I shall add, that the diameter of the earth is accounted by Cluverius, and other modern geographers, to be one thousand seven hundred and eighteen miles, and two elevenths; and by consequence the semidiameter from the circumference to the center, eight hundred, fifty and nine miles, and one eleventh part. Now what advantage or disadvantage can this eleventh part of a German mile; or, if you please, allow a whole one, which being four of ours, will overmatch, I believe, the height of any hill about Bath or Buxton. What, I say, can this bring to the increase or decrease of a fire under ground, that is above eight hundred and fifty German miles at a distance from it; when the most moderate and modest philosophers of this opinion are content with thirty? And yet this is made a necessary contrivance of that Being, that is Wisdom itself, and never intended weak men should pretend to philosophy, being the doctrine of the wise. . . . 'Tis here to be noted, that in the measures I have given of the semidiameter of the earth, I have followed the account of the modern geographers; whereas Alfurganus, the learned Arabian, mentioned by the two oracles of that language, Pocock and Golius, and other cosmographers among the Antients, as may be seen in James and John de Dondis of the Baths of Padoa, allow the semidiameter of the earth's sphere to be above three thousand miles, and place the cause of the heat in less than a hundredth part of that space from the surface of the earth; which is much the same with Cluverius, who makes the earth's diameter to be about 6,872 miles, according to our account. Besides, 'tis much that all rivers, and

more especially the sea itself, the bottom of which lies much deeper than Bath or Buxton, and therefore fitter to receive the heat of a subterranean fire, under so great a caldron, do not grow hot, and the sea much hotter than sometimes it is; which probably may arise from a fermentation, occasioned by the violent commotion, and strong agitation of the great variety of particles contain'd in the same; when a few cold springs, cover'd over, choak'd, and buried in dirt, glare and earth, 'till they can make their way to their heat, not far from the surface of the ground, and so much more remote from the central fire, shall be so highly favour'd as to participate so largely of the bounty of a subterranean fire, at so great a distance. I call the springs cold, because I am of opinion, that all the water of hot baths at first rise originally cold, as appears, when taken from the springs, in returning to the first principle to be cold again; there being no tangible body, solid or liquid, according to my Lord Viscount St. Albans, in Augmento Scientiarum, that is hot in its own nature but receives heat from another."[1]

1 By the following note, which is an extract from Guidott's edition of 1657, it will be seen that the writer did not agree with many of his contemporaries, nor with many modern geologists, as to the depth from which the waters rise and the cause of the heat:—"Since my first consideration of this matter, I was ever inclined to believe, that the cause of the heat and impregnation of the Baths was not far from the Baths themselves *(Coram adest quod quærimus)*, for to me it seems not a little strange that on digging so many Wells, Stone-quarries, Cole-pits, and other penetrations of the Earth to a considerable depth, that have been made about the City, no Hot water should appear, but only in one Stone Quarry near *Dunkerton*, about an hundred years ago, mentioned by *Jones* to have been so hot, that they were fain to forbear working." Guidott disbelieved Jones's story, but after what has occurred since, to which reference is made in this chapter, pp. 192 and 205, there is no reason whatever to doubt Jones's statement.

Several analyses of the Bath Waters have been made; those most deserving of attention are given in the following tables. The water examined was in each instance drawn from the King's Bath Spring; the specific gravity being 1.002:—

In an Imperial Gallon. 70,000 grs.	Phillips. 1806.	Scudamore. 1820.	Walcker. 1829.	Noad. 1844.	Merck and Galloway. 1848.
Carbonate of Lime ...	7.680	5.280	10.667	—	8.820
Carbonate of Magnesia	—	—	—	—	0.329
Carbon. of Oxide of Iron	0.274	0.200	0.243	0.521	1.071
Carbonate of Soda ...	—	—	—	5.760	—
Sulphate of Lime ...	86.400	98.320	81.624	96.240	80.052
Sulphate of Potassa ...	—	—	2.927	—	4.641
Sulphate of Soda ...	14.400	1.520	19.371	—	19.229
Chloride of Sodium ...	31.680	12.240	15.122	27.456	12.642
Chloride of Magnesium	—	15.360	13.339	7.142	14.581
Alumina	—	—	0.150	—	—
Silicic Acid	1.960	1.920	3.233	3.360	2.982
	142.394	134.840	146.676	140.479	144.018
Quan. directly observed	144.125	—	147.622	149.072	—
Carbonic Acid	11.25c.i	—	7.60c.i.	—	26.45 c.i. at 115° F.

Cuff is said to have detected Iodine in the waters, *Noad* remarks in reference to this substance, that "according to Stromeyer starch will detect free Iodine in a liquid containing $\frac{1}{450000}$th of its weight of that principle; if, therefore, any Iodine does exist in the Bath Waters, it must be in a proportion less than the above, and probably beyond the reach of chemical detection." Merck and Galloway found traces of both Iodine and Manganese.[1] Gibbes first detected Silex, and Scudamore Magnesia. Recently, however, Daubeny has suspected Bromine and Phosphoric Acid, and Roscoe of Manchester has discovered Lithium and Strontium, the metallic bases

1 The latter had been previously detected by Mr. R. Biggs.

of the Alkalies Strontia and Lithia;[1] the latter of which has recently been brought into notice as a remedy specially beneficial in Gout.

The following analysis of the King's Bath spring has been recently made especially for this edition of the work by Mr. Charles Ekin, F.C.S., F.I.C., a member of the well-known firm of chemists, Messrs. Savory and Moore.

SOLID CONSTITUENTS OF THE BATH MINERAL WATER.

	Grains per Gallon.	Parts per Million.
Calcium	28.1449	402.07
Magnesium	3.6569	52.24
Iron	0.8400	12.00
Potassium	2.154	30.78
Sodium	9.42	134.65
Silica	2.5012	35.73
Sulphuric Acid	74.2915	1061.30
Chlorine	19.3900	277.0
Carbonic Acid combined... ...	6.160	88.0
Ammonia	0.0175	0.25
Nitrogen as Nitrates	0.0035	0.05
Nitrites	Absent	Absent
Arsenic	Traces	Traces
Aluminium	Traces	Traces
Lithium	Traces	Traces
Strontium	Traces	Traces
Total Solids	165.2	2360.0

The Calcium exists almost entirely as Sulphate and the Iron probably as Carbonate. The Iron probably being a Carbonate, is held in solution by Carbonic Acid Gas, above a temperature of 100° Fahr., below that degree it is said not to be volatilized.

The water is of great organic purity, and the mere trace of Nitrates present clearly indicates that all surface water is effectually cut off and that the spring is collected in its original state without admixture.

(Signed), CHARLES EKIN, F.C.S., F.I.C.

1 Vide proceedings of Brit. Asso., p. 76, Bath, 1864.

The earliest analysis was made by Dr. Sheridan Muspratt for Dr. Wilbraham Falconer, and in his report which accompanied it, he observes that "the proximity in the results of the three waters proves their *identity*. In former analyses, as well as those I have just completed, a portion of the *lime* is tabulated as *carbonate*, but I have my doubts as to its existing as such in solution, owing to the *length of time* I had to boil the samples before any precipitation occurred. Is not the carbonate of lime, appearing so tardily on ebullition, the consequence of decomposition? The molecular appearance of the deposit, when viewed under the microscope, favours my hypothesis."

Professor Ramsay has calculated that if the sulphates of lime and of soda, the chlorides of sodium and magnesium, and the other mineral ingredients contained in the Bath waters, were solidified, they would form in one year a square column 9 feet in diameter,[1] and no less than 140 feet in height.[2] More recently also Professor C. Lloyd Morgan, of University College, Bristol, has spoken of the amount of rock brought up yearly by the Bath springs. The Professor shows that the yield was 385,000 gallons of warm water per day —containing 144 to 158 grains per gallon of solid material—taking the mean of 150 grains per gallon; the daily quantity of material removed would be 3·68 tons, and this in one year would make a column 9 feet square, and no less than 223·8 feet in height.

The small amount of mineral ingredients contained in a given quantity of these waters has not

1 Sir Charles Lyell's Inaugural Address, British Association, 1864.

2 The Springs of San Filippo (Tuscany), have formed a hill 250 feet thick, a mile and a quarter long, by a mile broad.

unfrequently been referred to as a valid reason against their efficacy. But it is, however, worthy of notice that many of the well-known Continental springs, which have for a long time, and still continue to enjoy, a deserved reputation in promoting recovery from the diseases in which they have been found to be efficacious, contain a considerably smaller proportion of ingredients than the Bath waters.

INDIFFERENT THERMAL SPRINGS OF EUROPE.

Solid Constituents in 16 oz. :—

Bath (England)	17·96	grains in 16 oz.	water.
Dax (Auvergne)	7·	,,	,,
Teplitz (Bohemia)	4·8	,,	,,
Warmbrunn (Silesia) ...	4·07	,,	,,
Wildbad (Wurtemberg) ...	3·58	,,	,,
Romerbad (Styria)	2·239	,,	,,
Gastein (Austrian Tyrol) ...	2·68	,,	,,
Pfäffers (Switzerland) ...	2·61	,,	,,
Schlangenbad (Hesse Nassau)	2·8	,,	,,
Plombières France)... ...	2·0069	,,	,,
Panticosa (Spain)	1·	,,	,,

INDIFFERENT THERMAL SPRINGS OF AMERICA.

Merrewether(CountyGeorgia) (resembles Bath) ...	18·46	grains in 16 oz.	water.
Idaho Springs (Colorado) (resembles Carlsbad) ...	13·39	,,	,,
Lebanon Springs	3·147	,,	,,
Virginia Warm Springs ...	2·997	,,	,,
Hot Springs of Arkansas (resembles Gastein) ...	1·069	,,	,,

EARTHY, CALCAREOUS, LIME-SULPHATED, INDIFFERENT THERMAL WATERS OF EUROPE.

Lucca (Tuscany)	21·	grains in 16 oz.	water.
Wildungen (Waldeck) ...	20·	,,	,,
Bagnères-de-Bigorre (Pyrénées)	20·	,,	,,
Lippspringe (Westphalia)...	18·	,,	,,
Luek (Loèche-les-Bains) ...	14·6	,,	,,
Weissenburg (Switzerland)	10·	,,	,,
Inselbad (Westphalia) ...	10·	,,	,,
Luxeuil (France)	8·5	,,	,,
Bormio (Upper Italy) ...	8·	,,	,,
Buxton (England)	2·	,,	,,

WARM SULPHUR SPRINGS OF EUROPE.

Aix-les-Bains	40·	grains in 16 oz.	water.
Burtscheid	32·	,,	,,
Aix-la-Chapelle	30·	,,	,,
Baden (Switzerland) ...	24·	,,	,,
Barèges	23·	,,	,,
Schinznach...	20·	,,	,,
Baden (Vienna)	14·	,,	,,
Meinborg (Pyrmont) Trunk-quelle	5·12	,,	,,
Landeck (Silesia) Weisen-quelle	1·563	,,	,,
Bagnères-de-Luchon ...	1·½	,,	,,
La Preste	1·	,,	,,
Cauterets	1·	,,	,,

Carlsbad—Alkaline, Saline, Thermal Waters ...	40·	grains in 16 oz.	water.
Royat—Muriated, Alkaline, Thermal...	40·	,,	,,
Ems—Muriated, Alkaline, Thermal...	25·	,,	,,
Neuenahr—Alkaline, Thermal	17·	,,	,,

The waters of Gastein are almost chemically pure, and yet their beneficial effects are attested by many trustworthy authorities.

The most abundant ingredients of the Bath waters, taking the above analyses as a whole, are—1, Sulphate of Lime; 2, Chloride of Sodium; 3, Chloride of Magnesium; and 4, Sulphate of Soda. The proportion of iron which has been detected is comparatively small, still its taste is quite perceptible in the water, and its effects on the system are more decided than could have been expected from the small portion which has hitherto been revealed by analysis. It appears somewhat remarkable that a larger quantity has not been discovered, since it is found, in combination with lime and some magnesia, plentifully deposited in the channels through which the water is conveyed to the private baths, and also on the pavements of the public baths.

The gases evolved from the waters are carbonic acid, nitrogen and oxygen. Lyell[1] adopts the theory that the nitrogen is derived from the deoxidation of atmospheric air carried down by rain-water. It may be imagined that the water thus supplied is furnished by some mountainous region—perhaps a distant one, that it then descends through rents or porous rocks till it encounters some mass of heated matter by which it is converted into steam, and then drawn upwards through a fissure by the expansive force of heat and steam, or by hydrostatic pressure. In its downward passage the water may derive its sulphate of lime, chloride of calcium, and other substances, from the decomposition of the gypseous, saline, calcareous, and other constituents of the rocks which it permeates. Bischoff, on the other hand, suggests the extrication

1 British Association, 1864, Bath.

of nitrogen gas from volcanoes and hot springs due to the action of internal heat on stratified organic matter. Daubeny infers that the evolution of nitrogen gas, when deprived of its normal proportions of oxygen, accompanying it in the atmosphere, is essentially connected with that igneous action which is going on in the interior of the earth, and that it is met with in thermal waters only because they derive their heat from the same chemical operations which give rise to the phenomena of volcanoes.

The result of Professor Daubeny's investigations, as stated by him in a paper read at the meeting of the British Association held in Bath, in 1864, is as follows :—"The spring that supplies the King's and Queen's Baths, the most of any, discharges 281 gallons of water, or in round numbers (reckoning 277 cubic inches to the gallon) 34.900 cubic inches per minute. Of this water 100 cubic inches were found by me to disengage, after long continued boiling, $3\frac{1}{2}$ cubic inches of air, consisting of 2.9 c.i. of carbonic acid, 0.4 of nitrogen, and 0.2 of oxygen, so that there will be present in 34.900 c.i. of carbonic acid, 1.012 ; nitrogen, 140; oxygen, 70; which quantity added to that of the free gas disengaged per minute from the spring, would make up the following amount—viz., carbonic acid present in the water, 1.012, disengaged, or free, 12; total, 1.024 ; nitrogen present in the water, 140, free, 245, total, 385 ; oxygen present, 70, free ditto, 10—80; total, 1489 cubic inches."[1]

As regards the carbonic acid found in these springs, the analysis by Merck and Galloway gives

1 Reports of proceedings of British Association, Bath, p. 42, 1864. Taylor.

somewhat more than three cubic inches of this gas to each pint of water; while the earlier analysis by Phillips gives somewhat more, and that by Walcker somewhat less, than one cubic inch to the same quantity of fluid.

It is interesting to note that Dr. G. Bischoff, in his work on chemical and physical geology, when speaking of the exhalations of carbonic acid gas, remarks that they are of universal occurrence, and that they originate at great depths, becoming by deeper penetration more abundant; and that the silicates which enter so largely into the composition of the oldest rocks are percolated by this gas. The rocks must be continually decomposed, and the carbonates formed by the new combinations thence arising must often augment the volume of the altered rocks.

It is to the presence of carbonic acid gas that the sparkling appearance of the water is due, when drawn fresh from the spring. It is a powerful stimulant of the nervous system, and its effects in contributing to restore pliability to stiffened limbs, and especially when applied in a gaseous form to the surface of the body, in alleviating certain forms of paralysis by reflex stimulation of the nerve terminals, are well known.

The quantity of nitrogen contained in the Bath waters, amounting to 97 per cent. of the gaseous matter yielded by them, is deserving of notice. Sir Lyon Playfair, writing on the gaseous contents of the Buxton water, observes that "the gases are nearly of the same composition as those of the thermal spring at Bath, and there is no reason to doubt that dissolved carbonic acid and nitrogen may exert important physiological effects." It is difficult to explain precisely the manner in which

nitrogen, from such sources, produces a beneficial effect on the system; but that it holds important relations with the animal economy is evident from the large proportion found in the blood, and in the organs of the animal system; and it is known that articles of diet must possess a due proportion of nitrogenous matter, in order that the body may be properly nourished. But while it is not easy to point out how this gas beneficially affects the system, yet if a spring be found yielding a large proportion of nitrogen, and containing no larger amount of solid ingredients than is yielded by spring water or ingredients, whatever may be their quantity, to which the entire good effects of the spring cannot be satisfactorily attributed, they must, it would appear, of necessity be partly referable to its gaseous contents. Dr. Sutro on this point observes, that "if we see the use of a mineral water causing distinct retrogression of anti-vital phenomena; if we perceive gouty concretions to proceed towards absorption; if we observe contracted limbs gradually to relax again, and to try feeble efforts of long-forgotten exercise; if we find cutaneous harshness and rigidity to diminish, and to give way to a former softness; if we behold a resuscitated desire for muscular exertion and for mental work in a prostrate individual, and we know the spa, the originator of these changes, to possess a great quantity of nitrogen, is it not legitimate to attribute to this gas part of the efficacy?" (*German Mineral Waters*, p. 69, 1851.)

Bath in Roman times may have been used as a great hospital sanatorium for soldiers broken down by old wounds and rheumatism; and Dr. Benjamin Richardson suggests, in his *Asclepeiad* that Bath should be again made a military water Sanatorium for the treatment of surgical injuries and gunshot

wounds. This system was carried out in connection with several thermal spas in Germany and France during the Franco-Prussian war. It is also strongly advocated in America by Dr. Loomis, of New York.

The much frequented German spring of Wildbad having a temperature of 98° F., to which invalids resort for the cure of ailments, the greater proportion of which are of the same nature as those which are recovered or relieved by the Bath waters, evolves about ninety-one per cent. of nitrogen, or six per cent. less than is yielded by the latter springs. One noticeable effect of the Wildbad waters is the restoration of flexibility to limbs stiffened by rheumatic paralysis, and the number of such cases which have thus been relieved by the Bath waters is very large.

The lime-sulphated water of Lippspringe, in Westphalia, with its principal spring, Arminiusquelle, having a temperature of 70° Fahr., and solid constituents of about 20 grains to a pint of water, has a marvellous celebrity in the treatment of pulmonary consumption by the inhalation of its vapour, which is made up of 87 per cent. nitrogen and 13 per cent. of carbonic acid gas, *i.e.*, nearly in the same proportions as the Bath vapour. In all catarrhal attacks of the throat, bronchial tubes, and asthma, it is considered of great value. At Lippspringe it is asserted that in pulmonary consumption the gaseous moist air induces freer respiration, the pulse falling, the cough and expectoration diminishing. It is, therefore, no longer a matter of doubt that the inhalation of nitrogen gas is useful in these catarrhs. The apparatus will be used in the inhalation room at the massage baths.

In 1866, Professor Williamson, writing to the late Dr. Falconer on the subject of the gaseous

contents of the King's Bath spring, says "the mean of two analyses of one specimen in which all the constituents were determined, gave nitrogen 96.222, carbonic acid 3.002, oxygen 0·578, marsh gas 0·198. With respect to the quantity of gas evolved from the King's Bath spring (the only one examined), the mean of six measurements give 2297 cubic centimeters per minute. It seems unquestionable that atmospheric air is acted upon by carbonaceous deposits which are evolving marsh gas by their decomposition, and that carbonic acid is formed at the expense of the greater part of the oxygen of the air. Most of the carbonic acid, no doubt, remains dissolved in the water. The discovery of marsh gas proves the presence of decomposing carbonaceous matter in contact with the water of the spring, and may, I think, be considered as proving the correctness of the above explanation."

It is not however to the presence of one or more particular mineral ingredients of a spring, except where they are found in large proportions, that its efficacy is to be attributed, or on which its selection as a medicinal agent will depend. It is to the union of the several substances contained in the water, the temperature,[1] and the quantity of fluid with which they are combined, and still more to the recorded experience and concurrent testimony of credible witnesses, that reference must be made for instruction and guidance in the choice and employment of a mineral spring.

1. For example Carlsbad has less solid matter than the cold springs of Marienbad, and considerably less than Tarasp, yet it is preferred generally to either of them on account of the high temperature of its famous Sprüdel, which is 162° Fahr. In this respect what Carlsbad is to the rest of the European Continental Spas, so are the thermal springs of Bath to the other spas of the British Isles.

Trousseau observes, "that, whatever may be said of them, mineral waters are not simple medicaments, and whatever may be the predominant mineralising agent as demonstrated by analysis, it acts not alone. Nature, in combining with the more or less notable elements which chemistry may isolate, and other exceedingly variable ingredients and principles which have not yet been discovered, has done for this mineralised agent that which we seek to imitate each day in our prescriptions, when we endeavour to re-inforce or diminish the effects of a medical substance by associating others with it. In making due allowance always for the particular phenomena which may result from the action of such and such elements which enter into the composition of a mineral water, we should not attribute to a single principle—however dominant it appears in the chemical analysis—all the properties of the water, as chemical experience can only permit us to judge."

It may here be mentioned that at certain seasons of the year vegetable matter is found floating on the surface of the mineral water, adhering to small masses of its deposit, and sometimes adhering to the walls of the open Baths; this consists of the *Oscillatoria or Conferva Tenuissima*, first found in the Bath waters, and described by the late Dr. John Ford Davies.[1]

"Its singular appearance," observes Sir J. E. Smith, "arises from the filaments being collected together into little ascending tufts, apparently rooted in the muddy deposit of the water. Each tuft proves on examination to consist of simple reniform, even

1. Dr. Falconer qualified this statement in a foot-note to the last edition of his work. Dr. John Ford Davies, he states, only repeated the results of a discovery made by the famous Dr. Lucas nearly a century before.

filaments, crowded together and quite pellucid, and equally destitute of joints, and branches; their diameter is not more than the 8.1000th or 10.000th part of an inch."

This confervoid growth[1] is one of many known to exist in the various mineral waters. The Sulphur waters at about 120° Fahr. contain *confervæ* called *Sulfuraria*. Microscopically they are transparent cylindrical tubes filled with globules, and containing animalcules. Access of air to the water is indispensable to the formation of *Sulfuraria*. In composition it is analogous to Glairine, an amorphous, nitrogenous deposit found in the Pyreneean springs, together with Barègine. Other microscopic Algæ have beendescribed in thermal waters. First—The *Monas Sulfuraria*, found in calcic sulphur water is spotted with red, elliptical in form, $\frac{1}{75}$ to $\frac{1}{100}$ of a millimetre in diameter. Second—The *Oscillaires* are greenish filiform bodies generally 5 to 30 m.m. in breadth. Third—The *Gallionella Ferruginea* are rectilinear, cylindrical in form, from $\frac{1}{1000}$ to $\frac{8}{10000}$ of a line, rusty brown, giving the water sometimes a rusty colour. These minute bodies are homogeneous.

Among the deposit of the waters, small fossilized fruits have also been found, as well as specimens of the *Spirifer Oolitica*, which was discovered by Charles Moore, F.G.S., in the inferior oolite of Dundry. (Vide *Somerset. Arch. and Nat. History Soc. Proceedings for 1854.)*

---

1 Dictionnaire Générale des Eaux Minerales

CHAPTER VIII.

"'Till taught by pains
Men really know not what good water's worth."
Byron.

BATHS.

So little has been written in this country on the Therapeutics of Bathing that it is proposed to speak of the physiological action of water, cold, warm and hot. To such classical works as those of Dr. Julius Braun on "The Curative effects of Baths and Waters;" Professor Leichtenstern's "General Balneo Therapeutics," translated so ably by Dr. Macpherson, in Von Ziemssen's "Handbook of Therapeutics," the profession owe most of their present scientific knowledge of the use of water.

Cold Baths.—Braun points out that a cold bath lowers the temperature of the skin up to 9° Fahr. within the limits of endurance, simultaneously the temperature of the blood increases from to 1°8 to 3°6 Fahr., according to the suddenness of immersion, but not in proportion to its duration. On the contrary, by prolonging a cold bath the heat of the blood sinks with the temperature of the skin, and at the termination of the bath the former remains somewhat diminished, even though the skin has recovered its warmth. The cold bath therefore is attended with an increase at first of the heat of the blood, but with

a subsequent lowering of its temperature. This is speedily equalized, sometimes in a few minutes, at other times requiring some hours. So long as the internal increase of temperature lasts the secretion of carbonic acid is increased, often 300 to 500 per cent. and *pro rata*, according as the temperature rises more and more rapidly. The pulse and respiration are at first quickened, becoming slower, and the latter deeper. Sensibility is at first increased, as seen in shivering and chilliness, then follows numbness if the bath be continued, but as soon as removal from the bath takes place the skin temperature is restored, and a heightened sensibility returns. The skin loses its turgor, the cutaneous muscular fibres contract suddenly and quickly, producing the familiar goose-skin. Internally there is excitement of the nervous system; the limbs tremble, lassitude follows, the muscular sense is inhibited, and general weariness of the whole body ensues. The lungs and brain rarely suffer, although shock sometimes occurs.

After the bath all the primary phenomena change. The feeling of cold ceases, succeeded by a glow, the sense of touch is restored, the skin relaxes, respiration becomes easy, sensorium becomes clear, a sense of freshness is felt, and the whole general condition is one of general refreshment. The best time of the day for a cold bath is the morning or noon.

A cold bath should never be taken during a state of fatigue. The duration should never exceed five minutes, nor should the bather go into the water overheated. Cold bathing is not adapted to the aged, the feeble, the very young, nor to persons with cardiac mischief. If reaction does not follow immediately, the time in the bath is too long, or cold bathing is undesirable. People with cold extremities, livid lips, and cold surfaces should avoid cold baths.

The cold bath varies from 70° Fahr. downwards, and stimulates by actively exciting the functions. The clinical cold bath comprises a temperature from 88 Fahr. to freezing point.

The Warm Bath.—From 92° to 98° Fahr. The mechanical processes are just the opposite to those of cold. The tissues relax, the capillaries become turgid, contraction following, with renewed acceleration of the circulation. In both cases the final result is the same, there being an increased circulation in the skin, and parts accessible to the physical influence of the bath. "The difference is important," says Braun, "with regard to the oxidation of the blood and tissues. Cold manifests itself in retarding the contraction of the heart and lowering the respiration, the air inhaled is denser, and richer in oxygen, and by increased oxidation the internal compensation for the external loss of heat is explained, and the whole effect upon the change of substance. In the warm bath the case is different, the amount of air breathed and oxygen inhaled is less, the secretion of carbonic acid from the lungs is increased, an increased oxidation takes place from the physical cause of greater heat of the blood. Upon the muscles enfeebled by disuse a person finds a stimulant in a cold bath, he feels disposed to take more exercise, and the wise use of the cold bath leads to increased tissue change. On the other hand, a warm bath is the charm to a weary, violently fatigued muscular system. This weariness is due to an excessive accumulation of functional products and the increased physical heat facilitates oxidation, and a warm bath ensures, at the right moment, hours of physical repose. It is related that Napoleon took a warm bath in order to continue his march at night and to fight another battle on the following

day." Braun sums up by stating that "*cold* refreshes by stimulating the functions, *heat* by physically facilitating them, and in this treatment lies the important practical difference between the cold water system, and the thermal method of treatment." Marcard has conclusively shown that baths below 98 Fahr. uniformly diminish the rapidity of pulse, and the normally rapid pulse usually shows the most marked variation.

The best time for a warm bath is during the morning, or, in some instances, at bed time. The stomach should be empty. The time of immersion from 15 to 30 minutes, sometimes longer, but cases of organic disease of heart and lungs require the utmost care.

The Hot Bath,—above 100 and upwards to 108 Fahr., can only be prescribed as a very exceptional remedy, and with the greatest caution, and should only last a very few minutes. It excites the vascular system to the highest degree of activity, the powerful stimulating action excites the most violent action of the heart and the whole internal system. Great heat directly affects the respiratory centre, and produces degeneration of the heart and spleen. It causes trismus in children. When taken let it be in the morning; stomach empty; duration five to ten minutes. It is, however, always more applicable to the middle-aged and old than to the young. Plethoric persons should not use them, nor should those persons who are liable to vertigo, hœmoptysis, or organic heart affections.

The Vapour Bath, in its various forms, as Berthollet, Russian, Irish, and Sool vapour baths, produces immediately a high degree of congestion of the skin as well as perspiration. It acts rapidly in

increasing the heat of the body, inasmuch as the body is not only heated by the surrounding hot medium, but evaporation is imposed by the already moist atmosphere. A high temperature cannot, therefore, be borne, and a vapour bath of 120° Fahr. in about twenty minutes will give a pulse of 140° to 150°. There is always redness of skin, fulness of pulse, and tendency to perspire, and the seeming perspiration is, for the most part, the condensation of the vapour of the body. The natural temperature of the body is raised, and if the vapour be inhaled the respiration is accelerated, and the water on the respiratory mucous membrane acts as an expectorant. The tepid shower bath, when the body heat is raised by vapour, is grateful and soothing, and is usually followed by dripping perspiration, most favourable conditions, which rapidly restore the normal natural heat.

The Russian Vapour Bath—is produced by pouring cold water on hot plates, the wooden apartment containing tiers of shelves, the heat of which increases with the increased elevation. The body is kneaded and the various joints shampooed, and when at its hottest cool or cold water is thrown on for a very short time, or the person rolls in the snow to cool, returning to the hot vapour room.

Hot Air Bath.—The surrounding medium increases the body heat, but presents the best conditions for its removal. The skin acts with increased activity, perspiration pouring away is converted into vapour, which absorbs large quantities of heat, and the body heat becomes normal. It has been shown that a temperature of 210° Fahr. has been borne for seven minutes in dry hot air, and the body not rising more than one degree in temperature. The loss by evaporation depends on the

duration of the bath. The physiological effects, say, of a hot air bath of 160° Fahr., give rise to smarting of the skin, the pulse becomes small and frequent, respiration is impeded, there is a feeling of tightness about the forehead, and a burning pungency about the nostrils, the mouth is dry, and copious perspiration covers the whole body, the after effects being altogether depressing, but sometimes it may be tonic.

Carbonic Acid Gas Baths.—The writer is familiar only with those found at Marienbad and Franzensbad, in Bohemia, where the free gas abounds in large quantities, and is used chiefly, and with great benefit, in uterine disorders of the atonic form and in sterility. The action of the gas on the skin is most peculiar. At Franzensbad the patient stands in a well, and the gas having been collected in a bell-shaped reservoir, flexible tubing conveys the gas to the well in the bath room, and as carbonic acid gas rises little more than three feet from the floor, which can easily be tested with a lighted candle, the patient always standing has respirable air enough to breathe. The well gas is also arranged to be applied locally, and is called a "gas douche." When placed in the carbonic acid gas well at Franzensbad, Dr. Carl Klein, a friend of the writer, experienced sensations which he describes as pleasant but most peculiar: such as a lively sense of warmth and pricking of the skin, flushing of the face, and diminished pulse beat. The general surface of the body seemed cold and the itching was intolerable.

The inhalation of carbonic acid gas for phthisis is so dangerous that it cannot be recommended, and is altogether unscientific.

Moor, Peat, and Mud Baths.—The mineral moor baths of the Germans are found highly perfected at Marienbad and Franzensbad, and are extensively used at these places; some thousands are given annually at these spas. They are to be found also at Teplitz, Elster, Meinberg, Pyrmont, Bruckenan, Steben, at the Hungarian spas of Pystjan and Teplitz, Trencsin, at the Euganæan Thermæ, in France in the Department Nord (not far from Valenciennes); while Neundorf, Eilsen, Wipfeld, Driburg, are most noted for the moor, sulphur, peat, and sulphur slime baths.

In Sweden and Finland baths with sea mud are held in repute, and as they contain much common salt, they may be regarded, says Braun, as strong sool baths.

The peat earth used, is a sort of turf, which is formed of the decomposition of plants, with the aid of mineral salts of various kinds, and the analysis of Radig of Franzensbad-peat in 1,000 parts of the dried mud consists as follows:—

Sulphide of Protoxide of Iron	24	parts.
Sulphate of Soda	38	,,
Sulphate of Lime	14	,,
Chloride of Sodium	10	,,
Protoxide of Iron	88	,,
Alumina	29	,,
Magnesia	14	,,
Silica	42	,,
Coarse Sand...	50	,,
Humic Acid and Ulmine	180	,,
Vegetable Substances	62	,,
,, ,, Undestroyed ...	423	,,
	974	

There are also sulphates of alumina, magnesia, strontia, lithia, manganese, and phosphate of lime.

The amount of the solids contained in the moor-peat depends on the place where it is taken, its preparation, its oxidation, and the salt contained in the water during the preparation of the bath. To prepare a moor bath the earth is saturated with water and steam into a pultaceous mass in a large wooden vat, great care being taken to break down the moor peat into a smooth plastic consistency, and the patient goes into this black mud bath at a temperature of 85 to 100 Fahr., remains in about half-an-hour, or longer if ordered, then passes into an ordinary warm bath, is cleansed thoroughly, rubbed and dried. These baths contain various skin stimulating substances, their action resembling brine baths; they afford, however, moist heat as the body, for the time being, is immersed in an immense poultice; its greater density, perhaps, has a share in its salutary effect, and they do not over-excite so easily as very warm baths. They excite the skin in a lively way, and produce very free perspiration. Sometimes a miliary rash appears, due to the friction of the mud. Although repulsive to the eye, the use of the mud baths is so popular in Bohemia that they deserve full investigation as to their action, although many contradictory hypotheses are extant. A rational theory is difficult to formulate, but they are in demand, and should be respected. The absorption of their chemical constituents, of course, is not believed. They are useful in rheumatic and gouty exudations, paralysis with contractions and general hyperæsthesia, and in some diseases of the skin, in sciatica, metritis, and other chronic and uterine exudations.

As a curiosity *Sand Baths* may be mentioned. The body is buried in the warm sand of the sea shore for some hours, and it is practised by the

Tartars in the Crimea. Eruptions, with slight perspiration, follow. The temperature of the sand is raised from 118° to 127° Fahr. The body is invested, then a warm bath, and then the body is cooled down. Their advantages are doubtful.

Pine-wood, Pine-needle, and Pine-leaf Baths are used at Carlsbad, Homburg, Blankenburg, Eisenach, and Friedrichsrode, in Thuringia, and in the Hartz Mountains. They excite the skin by virtue of their ethereal oils, resin and turpentine; and, being volatile, they penetrate the epidermis, and may be taken into the blood, being again eliminated by the various channels. They are looked upon as powerful tonic baths. Pine extracts are also added to sool baths, in order to make the bath balmy and refreshing. The evaporation from the bath has the same quieting effect upon the irritable bronchial membrane as is produced by the balmy air of pine forests (Braun).

It is necessary, in speaking of various typical baths, to include the Thermal Soolbäder of Germany, salt baths, rich in carbonic acid, and with temperatures approaching the indifferent thermals. Reference is intended more especially to Nauheim, near Homburg, with its Friedrich-Wilhelms-Sprudel, of 96 Fahr., and its Grosser Sprudel, of 89 Fahr.; and of Rehme-Oeynhausen, of 89 Fahr., in Westphalia. Professor Beneke claims special effects for these warm sool-baths. They represent an exciting form of bath, combined at the same time with a quieting influence similar to that produced by the cold water system and the moderate thermal system, causing a stimulation of central organs, the immediate influence of which is accompanied by a withdrawal of heat. This combination of the effects of the cold water system, the thermal system, and the simple sool baths, explains

why Rehme and Nauheim have taken their present position among the Soolbäders. Contrary to all other opinions, Professor Beneke claims here splendid results in the treatment of eczema and other skin diseases, when the treatment is combined with cold shower baths, and this teaching is unique in its way.

It is not proposed to enter further on the physiological phenomena of these Soolbäders, except to remark that the specific character of a gaseous thermal sool bath is, says Braun, "a moderate withdrawal of heat, rendered imperceptible to the senses through the effect of carbonic acid gas upon the sensitive nerves of the skin, combined with the centripetal stimulation of the nerves by means of the carbonic acid."

Of *Sea Bathing* it is only necessary to say that, besides being a cool and stimulating form of bath, the sea bath has also the effect of a sool bath. It is impossible, however, to separate them from the influence of sea-air, and Braun[1] points out how the sea bath holds a medium position between the cold and thermal systems, and may be considered as a climatic treatment, combined with a stimulating form of the cold water system; but it is necessary to remember that there is a class of people with whom sea bathing does not agree, on account of a defect in the eliminating, *not* in their assimilating power. In sea bathing the withdrawal of the heat of the body is increased by the constant motion of the water, thereby increasing and accelerating stimulation and promoting reaction, and with a lesser degree of cold of the water the bather gets a greater warmth of the air facilitating this reaction. The rule applicable to all cool and stimulating form of baths is to end the bath as soon as the reaction has begun, and before the depressing effect can take

1 Curative Effects of Baths and Waters.

place. The duration of each sea bath must be reckoned by minutes and seconds, and in the case of delicate persons the time should rarely exceed five minutes. Sea bathing may be looked upon as one of the most important restorative remedies for conditions which are not known as maladies, but only as individual states of weakness; but be it remembered that the peripheral contraction of the blood vessels causes a propulsion of blood towards the internal organs, and therefore cold and sea baths are prejudicial in their effects on persons inclined to internal hœmorrhage, such as apoplexy, uterine hœmorrhage, spitting of blood, and such like. Yet, however, in warm weather, sea baths with a maximum amount of salt and movement of the water are strongly recommended for hardening the skin of those subject to relapses of rheumatism, bronchial catarrh, and disorders dependent on taking cold.

Rohrig and Liebermeister have endeavoured to show that in sea bathing an increase of the excretion of carbonic acid, and an increased consumption of oxygen takes place, whilst others claim an increased metamorphosis of tissue, and an increased excretion of urea and sulphuric acid, and a diminution in the excretion of uric acid and phosphoric acids; but no very exact experiments on the subject up to the present time have been positively demonstrated.

Libermeister's Axioms on Hydro-therapeutics having become scientifically acknowledged, it is thought necessary in a work such as this to give an abstract of his conclusions. He first demonstrates what we understand by an Indifferent Thermal Bath as follows: baths which approximate in temperature to the normal heat of the human body are called Indifferent Thermals, in which not only

does the temperature of the body of the bather remain normal, but also the amount of heat given off to the water remains the same as would be given off in a similar period by bodies during their ordinary exposure to the air. Leichtenstern also points out that the point of thermal indifference must be deeper than the normal temperature of the skin, all the more so because in the bather that portion of the normal loss of heat must be covered by the increased giving off of heat to the water of the bath, which, under normal circumstances, that is, exposure to the atmosphere, would have been given off by radiation and transpiration. Following *Liebermeister's Axioms*,[1] namely :—

1. That the thermal indifference of a bath should be between 93·2 and 95 Fahr. The loss of heat which occurs in a healthy and not unusually fat man, in a bath of a temperature of 93 to 95 Fahr., lasting fifteen to twenty-five minutes, corresponds generally to the normal mean loss of heat. Bath is a typical Indifferent Thermal Bath.

2. Local abstractions of cold from the skin in the form of cold douches, wet packing, half baths, are not followed by any sinking, but rather by a rise of the temperature of the interior of the body, and the loss of heat in a healthy man is immensely increased in a cold bath, and the amount of loss is proportionate to the degree of difference of temperature; but the constancy of the temperature of the body in a cold bath is occasioned by the balancing both of the loss and of the production of heat.

3. But if the normal loss of heat is prevented by the use of baths hotter or warmer than the skin, warmth comes from the exterior, the heat in the

1 Ziemssen's Handbook of Therapeutics.

body accumulates and a rise of temperature is a natural consequence.

4. The effect of cold on the surface of the body is to produce an increase of the excretion of carbonic acid, and also of its production, and the increase is proportional to the production of heat.

Voit shows increased metamorphosis of tissue; and, reflexly, an increased conversion of fat by the action of cold. Pfluger's disciples have shown, that the excretion of carbonic acid and the consumption of oxygen diminish in a higher temperature. But if the temperature of the body is considerably raised in a hot, or vapour bath, then an increase of the conversion of tissue takes place, with increase of the excretion of carbonic acid, and of the consumption of oxygen, just as on the other hand both are diminished when the temperature of the body is considerably reduced in a cold bath. The warm bath, so long as the temperature of the body is not increased by it, does not decompose albumen, but increases it, and the result is different, and it is assumed therefore, that the hot or vapour bath which increases the heat of the body occasions an increased excretion of urea, or in other words an increased nitrogenous metamorphosis of the animal tissues. Cold baths, therefore, increase the conversion of fat; hot baths, which raise the heat of the body, increase the conversion of fat as well as the nitrogenous metamorphosis, and these, coming into use in the object to reduce increasing weight. Increased bodily exercise, a Banting diet, the use of mineral purging waters containing chloride of soda (common salt), as well as abundant water drinking, are all necessary to the achievement of the desired result. (Leichtenstern). The flow of urine

is temporarily increased after warm as well as cold baths, without the 24 hours' secretion being influenced much. The specific gravity of urine passed after a bath is higher after hot baths which increase the secretion of urea. Sweating baths diminish the flow and concentrate the urine, and this dripping favours the parting with heat. Hot vapour draws large quantities of water from the body by perspiration. We know not, however, with any certainty, whether warm baths, gaseous, saline, or otherwise, have any influence on the excretion of the individual constituents of the urine.

Influence of Baths on the Circulation and Respiration.—A bath hotter than the skin produces a dilatation of the cutaneous vessels, which is seen in an increased redness of the skin. The relaxation of the vessels in a warm bath lasts several hours after the bath is over. In a cold bath, on the contrary, the cutaneous contraction of the superficial vessels, is greatest at the commencement of the bath, and remits somewhat in the course of it, and further, the vessel-expanding *after* the operation of cold baths, and the vessel-expanding operation of warm baths, seem to be increased by saline and gaseous contents. The frequency of the pulse is increased correspondingly with the increased heat of the body in baths of the heat of the skin, which induce a general rise of the temperature of the body, as well as in hot and vapour baths, but there are no perceptible influences from the use of the Indifferent Thermal Baths; those, however, that contain salt and gas produce some hyperæmia of the skin. Cold baths, by reflex contraction of the skin vessels produce an increase of blood pressure in the arteries. Conversely, in a hot or vapour bath the expansion of the cutaneous vessels is followed by a reduction of the mean blood

pressure, but the existence of vessel dilating depressor nerves has been proved by Goltz, Schiff, and Vulpian. The subject, however, is too extended for further mention here. We are warned not to overvalue the effect of baths on the dilatation of vessels and the distribution of blood in the frequency of heart contractions and on the blood pressure, as other causes in daily life, such as physical exertion, nourishment, mental recreation, change of surrounding temperature, etc., all have more or less influence on the changing action of organs in various powerful ways.

It has been mentioned that the amount of air respired in a cold bath is increased, and Vierordt has taught that the increased excretion of carbonic acid is entirely and solely dependent on the increase in the volume of respiration; but in the case of indifferent thermal baths no alteration in respiration has been observed, yet in vapour or hot baths above normal heat, especially in the former, it is increased proportionately to the increase of the heat of the body and of the production of carbonic acid. (Leichtenstern.)[1]

Influence of Baths on the Nervous System.—Prolonged warm and vapour baths (all of which increase the heat of the body, the frequency of pulse and respiration, the excretion of carbonic acid and the conversion of substances rich in nitrogen) usually cause lassitude and sense of fatigue, inducing sleep. The exciting and depressing influence of cold and warm baths on the action of the brain may be sought in a reflex influence on the vessels of the brain, produced by the thermal stimulus of the skin sensory nerves. (Liebermeister). Traube has shown that lukewarm baths diminish the excitement of different nerve

1 Ziemssen's Handbook of Therapeutics.

centres through the peripheral ends of the sensory nerves, and conversely; most people know, moreover, that a cold bath excites reflex movements through the sensory skin nerves, but it is well to say that warm and cold baths through the nervous system, have various actions on the economy of organs, which, up to this time, are not known to us.

Mechanical action of the Bath—Leichtenstern shows how the mass and weight of a bath may act, pressure being increased by movement of the bath-water, the mechanical friction of the skin in the bath being artificially increased by massage, falling douches, etc., by powerfully stimulating the cutaneous nerves. The stimulation is the chief mechanical factor in the bath. It is conveyed to the central organs, inducing various reactions, such as fatigue or invigoration, an increase or decrease of bodily energy, and exciting the action of cardiac and respiratory centres; and probably many of the therapeutic effects of baths ought to be ascribed to the mechanical stimulation produced by the water, but, in most cases, the mechanical is added to the thermal factor, since both operate qualitatively alike as far as skin stimulation is concerned. It is thought that probably 500 to 600 kilogrammes are in an ordinary bath added to the atmospheric pressure of 15·540 kil. on the whole body.

Electrical operations of the Bath.[1]—Various theories of the action of electricity on mineral water have found exponents in Scoutetten and others. The most that is known positively is that common well water has been found in a *positive* condition, as also carbonic acid water, whilst sulphuretted hydrogen water was found *negative*. It has not been proved that a total current of electricity, like the frog current,

1 Ziemssen's Handbook of Therapeutics.

exists in man, and it is asked, with much force, what physiological or therapeutic action can currents have which are so minimal that they can scarcely be indicated by a multiplier of many thousand cells? It is quite unnecessary, says Leichtenstern, to enter further on any of these groundless theories, but to follow the axioms as far as facts warrant, namely, "that the electrical minimal currents which arise by the contact of different temperatures, and also of the body of the bather with the water, which is usually of different temperature from it, have not for the present any practical or theoretical importance."[1]

Electricity in connection with the Bath Waters. —Many years ago the late Mr. John P. Tylee, a scientific chemist and electrician of this city, wrote an unpretentious pamphlet on the advantages of galvanism, when applied through the medium of the Bath mineral waters. His plan was to make the bath form a portion of the electrical circuit, and by connecting a Faradizing brush with the positive pole of the battery, the patient during the bath has the brush applied to the affected part, the intensity of the current being regulated in the usual way. Mr. Tylee considered that by passing the current through the warm bath he was using the best possible medium for its application, because it did not produce violent shocks; that in the water the electric flow was continuous; and was especially applicable to the more sentient extremities, so that the minute fibrillæ of the muscles experienced a pleasurable rather than a spasmodic action (and by the aid of a portable disc he was enabled to produce this effect at will, and to regulate the current so as to apply it only to certain points in the muscular system). The cases of Mr. Tylee, seen by the writer, in connection with Dr. Wilbraham Falconer,

1 Ziemssen's Handbook of Therapeutics.

were muscular atrophy after continued fevers, gouty articular deposits, lead poisoning, and certain forms of paralysis, chiefly spinal—and the results were beneficial. It was clearly ascertained at the time that no change or decomposition of the mineral waters took place in any way from the action of the electrical current.[1]

Coming down to recent times,[2] Dr. Tibbits, speaking of the electric bath, and admitting its convenient and pleasant mode of administering electricity, found the bath less beneficial (except in certain gouty and rheumatic cases) than localised applications of electricity, according to therapeutic requirements. Dr. Tibbits uses the voltaic or the induced current, and recommends a wooden reclining bath, insulated on glass supports, and water at 95 to 100 Fahr., and the electricity is applied by large metal plates, applied to the head in connection with one pole, and a second plate in connection with the other pole at the foot, the patient being protected from direct contact with either plate by a smooth wooden framework. This requires a powerful current in the water. If, however, one pole is applied to some part of the body of the patient out of the water less power is required. The same writer considers the value of this mode of administering electricity to lie in its power of eliminating metallic poisons, such as lead (plumbism) from the body, and that the conjoint influence of hot mineral water and electricity in promoting elimination of the mineral is exceedingly valuable.

1 There was nothing new in this application of electricity even in Mr. Tylee's time. The theory, at any rate, had been long propounded, and others less skilful than Mr. Tylee had made experiments with varying success. To Mr. Tylee belongs the credit of complete success in the practical and systematic application of galvanism, in conjunction with the Bath Mineral Waters.

2 Medical Electricity.

Absorption in the Bath.—For a long period of years powerful absorption in baths of water with its contained salts, by way of the skin into the blood was looked upon as an indisputable fact, and, even up to the present time, Sir Alfred Garrod, it is fair to say, assumes this doctrine to be correct. But after all the *pros* and *cons* as to absorption in baths have been critically discussed the writer still contends that such does not take place. After a long continued immersion in a warm or hot bath some water is taken up by the cuticle, but it is so trivial that it cannot be quantitatively determined, weighing the body after certain experiments having proved only negative results.[1] Krause and others found that water and salt only impregnate the superficial skin-layer, but they penetrate no deeper. Water in or on the cuticle is known to evaporate immediately after a bath, the grains of salt scaling off on exertion. The sebaceous follicles and unctuousness of the outer layer of the skin prevent all imbibition, and the only parts of the human body devoid of these glands are known to imbibe freely—as for instance, the palms of the hands and soles of the feet—and various experiments such as weighing the body after long immersion, the specific gravity of the urine, etc., which have been made to prove absorption, have signally failed. Imbibition is granted but nothing more; absorption into the blood is quite another thing.

Increased flow of urine is the rule after warm baths, but this secretion is only a passing one. Valentine has shown that the quantity passed daily was not increased, the temporary flow being followed by compensatory diminution, so that the increase is probably accounted for by the suppression of the perspiration during the bath. Rohrig, in relation

1 Ziemssen's Handbook of Therapeutics.

to this, has pointed out how much the excitement of the skin nerves contribute to this process; Flechsig corroborates. Beneke and Rohrig proved that in brine baths no increase of salt is excreted by kidneys; and what is true of common salt is equally true of the salts of iron. In mineral waters, and even when footbaths of lithium were used, spectral analysis failed to give any positive results of absorption. The general consensus of the best opinions accept therefore the question of non-absorption, by a healthy skin, of salts dissolved in baths that are not volatile or corrosive; but it is accepted as true that the skin is capable of absorbing substances that are volatile, in the form of gas or vapour, as well also as the non-volatile substances that require hard rubbing into the skin in the shape of salves, such for example as mercury. Braun, even with the most delicate tests, could never detect iodine in the secretions when proper measures were taken to prevent its volatilization into the air inspired.

Demarquay, however, it is said, after pencilling one patient in a hospital with iodine, was able to detect that substance in the urine of all the other patients. Voit and others also showed that the sweat and sebaceous follicles are favourable to absorption when marked force was used, the amount absorbed being dependent on this act being thoroughly carried out. Rohrig wore a mercurial plaster and found mercury in the urine, and concluded that it came there through being volatised; but the same author made another series of very valuable experiments by pulverising water containing non-volatile substances, and applying in this state of fine reduction found that they were absorbed, and he ascribes the reason to the fineness of the water projected against the skin, and to the state of extreme

minute division. This is important when dealing with the action of the massage, as, by the aid of powerful Aix-les-Bains douches, with skin rubbing some absorption of the salt contained in the water may be brought about. Brémont corroborates, but it is proper to say the quantities, possibly, may be only minimal.

The experiments of Gerlach and others clearly show the power of the skin to absorb gases, but it is illusionary to suppose that the gases contained in the baths of mineral waters are absorbed. There is no such proof, and as to carbonic acid gas some minimal quantities may possibly be absorbed. Given a bath rich in that gas, it can only occur in accordance with a well-known recognised chemical law, "in proportion as the pressure of the carbonic acid gas of the mineral bath exceeds the tension of the gas in the circulating blood and in the lymph." And the seeming intoxication attributed to baths rich in carbonic acid depends on the inhalation of the gas developed in the bathing water. The case is different with other gases not found in the blood, such, for instance, as sulphuretted hydrogen.

Leichtenstern sums up and formulates as follows:—"An imbibition of water, and of the salts dissolved in it, can take place in a bath in the most superficial layer of the epidermis. Among the most favourable conditions are warmth, long continuance of the bath (several hours) removal of the oiliness of the skin (secretion of sebaceous follicles) whether by previously cleaning the body with soap and water, or by repeated baths, or by the slight soapy action of the constituents of the bath. The palm of the hand, and the sole of the foot having *no* sebaceous follicles imbibe water most easily. Imbibition has not absorption as a necessary con-

sequence, as it is probable the water imbibed by the most superficial layer of the epidermis evaporates immediately after a bath. The imbibition is, under the most favourable conditions, of such trifling amount that it cannot be determined. An absorption of the water, and of the non-volatile contents dissolved in it in ordinary baths has not been proved. The outlets of the sweat and sebaceous follicles are not adapted to the absorption of water. Water can be forced by very strong friction in the bath into the ducts of the sweat and sebaceous follicles and be absorbed, but the quantities are so insignificant they can have no physiological or therapeutical importance whatever."

CHAPTER IX.

"Honest water which ne'er left man in the mire."

Shakspere.

BATH:

IN ITS MEDICAL ASPECTS.

Dr. Julius Braun, of Rehme Oeynhausen, writing of the Hot Indifferent Thermal Springs, expresses surprise that in England, Bath, which enjoyed for centuries a great reputation, should in modern times have become somewhat neglected.[1] He observes how much the Bath springs resemble those of Luek, in Switzerland, and he points out that, with the mild and equable climate of Bath, and from the frequency of gout in England, Bath must be the real English Teplitz. He also expresses his astonishment that, with the great abundance of hot water in Bath, a military sanatorium for rheumatic and gouty patients or those who suffer from the effects of wounds and accidents, should not have been established. Dr.

1 Dr. Braun's impression is derived from the state of things twenty years ago. At *no* previous period have Bath and the springs been held in such high estimation as at the present time. The authorities have exhibited most commendable enterprise, and are making such magnificent provision for every system of bathing, that Bath will possess unrivalled accommodation for every class of invalids.

John Macpherson, the author of "The Baths and Wells of Europe, and The Lime-sulphated Waters," bears the following testimony to the value and efficacy of the Bath waters. In effect he says that many complaints which were treated with great success in Bath, have been remitted to similar baths on the Continent. Gradually, however, Bath has resumed its ancient repute. The most popular class of water abroad is that of Contrexèville, and this—although cold—presents a striking analogy in its chemical constituents to those of Bath, including its gases, especially the carbonic gas, and the same mildly exciting and stimulating effect is ascribed to the prudent drinking of both, and as the Contrexeville water is so celebrated in biliary and urinary concretions, so in Bath the mineral waters were formerly employed for the same diseases; and he pertinently asks—*Why should they not be used again?*

Why, also, should not Bath waters be used again for decayed stomachs, tropical diarrhœas, and fluxes, as they were formerly in the time of Guidott and Peirce? Why should not asthma be treated in Bath? Why is not the Mont Doré cure practised, and why are not the inhalation methods of treatment in lung diseases carried out, as at Lippspringe and elsewhere? (Macpherson) Nature in her most beneficent mood has conferred the richest boon upon Bath in unstinted measure, and the blessings of Providence have been wisely appropriated by the skill of man. It may be that what remains to be done will be done in a manner which will vie with those continental methods to which reference is just made.

Dr. Macpherson sums up by saying, *What has been done once in Bath can be done again.* The hotels in Bath are good; lodgings in the fine squares, parades, and crescents are equal to any-

thing abroad; whilst "many of the complaints," says Dr. Macpherson, "sent to the Continent to lime-waters could be treated just as well at Bath, when it is so commonly desirable for these cases to remain in England;" and, moreover, the waters can be drunk and the baths used all the year round.

During the hot months of July and August a system of tepid bathing, suitable to the season, has come into vogue, and reasonably so; and although in the hot months it may be desirable to send certain chronic articular cases to Buxton for a short course for strengthening and giving perfect tone, it is more from the climatic than the bathing point of view. Buxton has its advantages, and although its waters are almost pure, containing only a small degree of chemical salts, yet its high elevation and the excellent and varied modes of administration, speak well for it in July, August, and early September. From a therapeutic point of view it is useless to extol Bath over Buxton, because the waters of the former contain more solids than the latter. The probability of a cure from the water in this or that place is not to be estimated by the relative proportion of the solids to the fluids; most places have merits of their own, indisputably. For example, take Carlsbad, Marienbad, and Franzensbad, the Glauber-salt spas of Austrian Bohemia. Carlsbad, situate in the valley of the Tepl, with its great number of water-drinking visitors, is rightly extolled as the greatest and most potent spa in Europe. Still the Marienbad waters contain more than twice as much solid matter as those of Carlsbad. Each has its distinctive therapeutic value. Carlsbad water, by reason of its high temperature, and the almost Spartan simplicity of the diet and discipline

imposed by the medical men, and generally submitted to with docile obedience by the drinkers; Marienbad, with its high elevation, fine dry air, cold carbonized springs, forest scenery, and moor baths; Franzensbad, with its cold highly carbonised alkaline and saline chalybeate springs, and its moor baths, is built on a marsh, yet is one of the most elegant and luxurious towns in Austrian Bohemia, and, as a ladies' bath, is unsurpassed; each, and all of these, being almost within hail of each other, has its own special and distinctive features. The amount of solid material in these waters, respectively, varies immensely; but such variation is, perhaps, of little practical importance. The varied forms of disease for which treatment is sought in these towns are well defined, and there is little doubt that the respective proportion of cures bears a close comparison with each other. People with liver disorders are sent to Carlsbad and Marienbad; uterine disorders to Franzensbad and Ems; the syphilides to Aix-la-Chapelle; the chronic gout and rheumatic cases and skin complaints to Aix-les-Bains, Wiesbaden, Wildbad, Gastein, Baden-Baden, Bath, and Buxton; strumous diseases to Kreuznach; visceral catarrhs and congestions to Homburg and Kissingen; cases requiring sulphur baths to the various Pyreneean spas, and so on.

The great art of hydro-therapeutics is to clearly distinguish the "kind of place for the kind of case," and to arrange accordingly. In selecting a spring due regard should be given to the chemical composition and strength of the water, and to the clinical experience of its action, the patient's constitution and malady, site of locality and its aspect, nature of climate, distance to travel, and the season of the year for treatment. Bath has the advantage of

being within easy reach, and accessible at all times and seasons of the year; most continental spas are closed during the winter months. The fate of many a watering-place is dependent not only on the nature and inherent virtues of its waters, but in a very large measure on their careful administration by the medical practitioners, and of the varied modes of adapting them to each individual case. In the diagnosing of every such case the opinion of the family physician must always be deemed of the first importance, and due consideration given to former habits and mode of living, etc. Delicate patients, for instance, may require many modifications of ordinary rules, such as avoiding baths before food in the early morning, the careful regulation of daily baths, water drinking, and so forth.

Hydro-therapeutists are well agreed that chemical analysis does not always afford a complete and trustworthy test of the virtues of mineral waters; they are complex remedies, for which no equivalent or substitute in medicine can be formulated in the laboratory. Chemistry cannot accurately point out by analysis the varied administration and uses of mineral waters. The spectroscope may define the presence of lithia or arsenic, but its accurate therapeutic value in any given water cannot be arrived at. It has been pointed out elsewhere that chemical analysis invariably disturbs the grouping of affinities, and the loss of gases in evaporation, for instance, certainly affects the fixed constituents of the various highly charged mineral waters. It becomes, therefore, in practice, a question of the difference of clinical experience compared with the difference of chemical analysis.[1]

Bath, as an Indifferent Thermal, lime-sulphated, or earthy calcareous water, stands out boldly among

1 Journal of Hydrotherapeutics.

the large list of these waters in Europe and America. As a lime-sulphated water it bears the closest resemblance to Luek (Leukenbad, Louèche-les-Bains), Canton Wallis, in Switzerland, with its twenty-two springs. Luek, however, has an altitude of 3,527 feet. Its temperature of 124° Fahr., and its solid constituents of about 15 to 16 grs. in 16 ounces of the water; and its gases of nitrogen, 93·4; carbonic gas, 51; are very remarkable. Luek has been famous for ages for the treatment of chronic skin diseases, and for Hebra's system of prolonged immersion—for hours together. Hence floating tables are used, the ladies and gentlemen reading, playing at dominoes, and taking their meals, the bathers being attired in woollen mantles and capes, and in this manner "while away the time." The temperature is usually a little below blood heat. In some respects this may remind the reader of the custom of bathers in Beau Nash's, and even later times, in Bath, when a similar system existed. There is little doubt that in certain chronic indurated skin diseases Hebra's system of prolonged maceration is the only cure.

At Lippspringe, in Westphalia, the gases evolved by the waters of the Arminiusquelle are similar to those of Bath, consisting of 87 per cent. of nitrogen and 13 per cent. of carbonic acid. Admirable appliances are provided for the inhalation of these gases, by which great results are attained. Whether phthisis is as well treated there as bronchial, laryngeal, and pharyngeal catarrhs, admits, perhaps, of doubt; but it is thought by some that the cough is relieved, respiration becomes freer, and blood pressure is diminished, by following the Lippspringe system. The same or a similar method can be pursued at the new inhaling rooms at Bath.

Inselbad has three springs and two inhaling rooms adjoining. Lippspringe is less exciting, but the action of the waters is of a sedative character, due probably to their containing less carbonic acid. The large swimming bath is also a great feature there.

Wildungen (Waldeck), has numerous springs, rich in carbonic acid, and Bormio, in Italy, 4,300 feet high, has eight springs, poor in carbonic acid and mineral ingredients, but these have a great reputation for lung diseases, neuralgia, gout, and rheumatism.

Bath, as a simple Indifferent Thermal Water, bears favourable comparison with the following European spas:—Schlangenbad, Wildbad, Gastein, Teplitz, Ragatz, Pfäffers, Johannisbad, Warmbrunn, Tobeldad, Neuhaus, Tüffer, Romerbad, Villach. In America with the hot springs of Arkansas, which resemble Gastein and Pfäffers; the Idaho hot springs, Clear Creek, County Colorado, which resemble Carlsbad; the warm springs, Madison County, North Carolina, which resemble Luek, in Switzerland; Merriwether Springs, County Georgia, a lime-sulphated water, resembling Bath in mineral ingredients and temperature; the Lebanon springs, Columbia County, New York, like the sweet springs of Virginia. The warm springs of Bath, Co. Virginia, containing lime-sulphated waters, rich in confervæ, resemble the serpent bath at Schlangenbad, in Nassau, with its silicates giving the unctuous feeling of the waters peculiar to Wildbad; also the Puebla hot spring, Humboldt Co., Nevada, of which Dr. Blake speaks as the "Diatomed spring," the ground around being composed of infusorial earth of great microscopic beauty. Bath resembles all these in mineral ingredients, temperature, and gaseous equivalents.

Indifferent Thermals in Europe.—The difference in temperature of the indifferent waters in Europe is very considerable. Schlangenbad is one of the coolest, whilst Teplitz is an example of the hottest. In the former the nervous system is quieted and benefited ; in the latter marked effects are exercised on the nervous system by absorption. Romberg, of Berlin, indeed, denominates some of the milder German thermals as "nerve baths," the chief with low temperatures being Schlangenbad, Johannisbad, Tobeldad, and Villach. The charming repose of these places, with their picturesque positions, surrounded by woods and mountains, together with the mild sedative action of the waters, are, therefore, as a rule, recommended to the highly nervous patient seeking repose. Buxton, in the summer months, will rank with those health resorts. On the other hand there are thermals in Germany which are denominated *Wildbäder*, or wild baths, situated on Alpine elevations, with waters of high temperature ; these comprise Gastein, Wildbad, Ragatz, Pfäffers, besides Plombières, the French Teplitz, Warmbrunn, Neuhaus, and Luxeuil, in the Vosges. The Styrian spas, Tüffer and Romerbad, should also be mentioned.

It has been noted by Braun, that the higher the situation the higher in proportion are the bath-temperatures, which are especially suitable for irritable organisms ; on the other hand, the lower the situation the cooler must be the bath selected for such constitutions. The more irritable the patient the more, in an inverse ratio, is a lower temperature or a higher situation indicated ; and by a parity of reasoning the more atonic the invalid the higher should be the temperature of the water and the lower the physical situation. In mixed cases where due importance must be attached to both considerations

there are bathing resorts to be found, and Bath is one of them, which possess the medium characteristics. Wiesbaden, for example, as a very warm bath, exhibits indications similar to those of Teplitz, but inasmuch as it contains $\frac{2}{3}$ per cent. of salt it can scarcely be looked upon as a sool bath. Some sulphur thermal springs, with high temperatures, and containing but little solids—their effects being produced by the heat—should be included in these thermal classifications. (Braun). At most of the places above mentioned bathing is the all important business; at Bath, however, drinking the thermal water is as essential an element of the treatment as are the varied processes of bathing there. Gutmann asks if heat is motion, according to the teaching of natural philosophy? The answer is that when the heat of the body is increased the smallest particles it contains are set in quicker motion and by this process the adhesion of atoms is diminished and the molecular attraction decreases; and it follows that if the hot thermal waters produce these phenomena, it will go far to explain the signal results achieved by Bath, Gastein, Teplitz, Aix-les-Bains, Wiesbaden, all of which possess high temperatures. Although Professor Tyndall[1] states that he is ignorant of any difference between natural heat and artificial heat—from a chemical point of view—yet notwithstanding experience clinically shows that in their effects such is not quite the case as regards thermal waters. Dr. G. W. Lawrence, writing of the natural thermals of Arkansas, is of opinion that a positive difference exists between these thermals and artificially heated water, which he attributes, amongst other causes, to the thermo-electric properties of the thermal waters

1 Walton's Mineral Springs of America.

—if such exist.[1] He says that the natural water produces a stimluating sweat, the artificial water a relaxing diaphoretic action; but be this as it may, why, it is asked, should hot mineral waters be more active medicinal agents than artificially heated water? (Walton.) It is agreed that, apart from the highly charged gases present, the uniform and continuous temperature of the thermal distinguishes it from the ordinary heated water. The latter not being heated throughout and from the time it passes into the bath, decreases in temperature, as if heated by steam, thus alternating each moment in temperature; while, in the hot springs, the water continually remains at the same heat.

Then the dexterity and perfect manipulative modes of application, in themselves go towards maintaining the thermal efficacy. Besides the equable bathing establishment, passages, cooling and packing rooms, are constantly at the proper temperature, and the tendency to chill is thus obviated. The mysterious and supernatural agency once popularly ascribed to the "spirit of the well" (Brunnengeist), to which all the cures were attributed, no longer appeals even to the superstitious. Moist heat, climate, social comforts, and general system of treatment, go to explain the daily results. The ancient Bath physician, Dr. Robert Peirce, in his work, "Bath Memoirs," published in 1697, has, in the following quotation, clearly shown the knowledge he possessed as to the cause of thermal baths retaining their temperature over water artifically heated. He had filled a tub with the mineral hot-bath water on a frosty day, with a window open upon the tub, and found, after 17 hours exposure, that the water was still warm;

1 These theories are given for what they are worth. As to the "thermo-electric" idea, the writer thinks it rests on no scientific or rational basis.

hence he concluded that it had "no extraneous heat as that of underground fires, but from some mineral particles rather within itself which until wholly evaporated continue the waters more or less warm, and these mineral particles probably stick closer to the little globules that make up the consistence of fluids, than those communicated by fire can possibly do." In the practical use of the thermal baths of Bath common water is not now added to them to lessen their temperature, all baths being cooled down to the prescribed heat, the bath attendants well knowing by experience how much greater length of time is required to realize this process as compared with artificially heated water of 120 Fahr.

Vapour Baths.—These baths belong to the thermal as well as to the cold water systems, which are clearly explained in these pages. The natural thermal vapour bath according to Bartel and Nannyn's experiments raises the temperature of the blood from 1·8 to 5·4 Fahr., and increases the excretion of urea; and in a man, weighing 51 kilos, Bartel saw, by the aid of a thermometer, the temperature rise in the rectum from 104 to 104·5° Fahr., in the space of ten minutes. Braun also shows that the therapeutic effect is to excite copious perspiration and to remove the effects of recent cold; and also as a result of violent perspiration, and an artificially produced congestion to stimulate the absorption of long standing rheumatic exudations. The value of the vapour bath is acknowledged in recent rheumatism and gout in the joints and muscles, in chronic rheumatism and neuralgia, and especially in sciatica as well as in malarial fevers; and in the Russian vapour bath Rust considered syphilis, lead and mercurial poisonings, and other states of cachexia suitable cases for treatment.

Turkish baths are hot air not vapour baths, and greater heat can be borne in them.

To Aix-les-Bains, in Savoy, are owing the principles contained in the new massage baths at Bath, and consequently it would be much out of place to draw any invidious comparisons. The thorough going principles adopted at Aix are carried out in Bath in their entirety. This result is no doubt to a great extent, due to the fact that some of the Aix doucheurs have come to Bath for the winter. These people carry out the douching to perfection; they inherit all the lightness of touch, rapidity of movement, and sang-froid peculiar to their order. The same number of douches, inhaling and atomising rooms and Berthollet natural vapour baths are not required in Bath as at Aix, but the same treatment is carried out even to the minutest details. There is this difference to be borne in mind that, whilst the course at Aix-les-Bains is limited to the period between April 25 and Oct 15, in Bath it extends over the whole year, without any intermission. Cooled down tepid mineral baths are adapted to the hotter months of June, July, and August, the Aix douches being modified according to the external atmospheric temperature. Between summer and winter the difference in the temperature of the water should be from 4 to 6 Fahr. Drinking the waters goes on simultaneously with bathing, which is one of the essential differences between Bath and Aix. At the latter place, in comparison with Bath, the quantity taken is small, and that at less frequent intervals. Drinking the waters by order of the bath-doctor during a definite course, is an important feature in the treatment, and it rarely disagrees with the patient. The remarkable topographical position of Aix, its fine summer climate, the cool

breezes and enjoyable boating on the Lac du Bourget, are all elements tending to health and enjoyment. Moreover, the beautiful locality and the picturesque excursions, which afford so much rational enjoyment, apart from bathing considerations, render Aix-les-Bains a health resort unique of its kind. The person who can leave Aix, after a sojourn, long or short, without feelings of mingled pleasure and regret, would be difficult to please. It may however, be here stated, that the special methods of inhaling the cold sulphur waters and the pulverization modes of treatment employed at Marlioz, together with the special forms of baths suitable for diseases of women, will be brought into use in the Bath system, with equal if not superior efficacy.

During a recent stay at Carlsbad the writer became much interested in some remarks of his friend Dr. Kraus—one of the eminent water-physicians of that place[1]—contained in his work on Carlsbad. He remarked "that some gouty patients, although feeling well while drinking the waters, found the baths disagree with them, became physically weak and mentally depressed after the first bath, and in some instances suffered from repeated attacks of gout, so that the bathing had to be discontinued, and then the arthritic symptoms disappeared." Frequently, however, he found in his practice that if such patients were sent to some Indifferent Thermal Spring, such as Gastein, Ragatz, or Wildbad, the baths at those places produced a very good effect upon them. It was difficult to explain this strange fact, but Dr. Kraus believed that it arose from some peculiar individual idiosyncracy, such as the increased or deficient irritability of their

1 Carlsbad, by Dr. Kraus.

vascular systems. It seems, however, more than probable that the favourable change effected was due to the different climate, and that the indifferent thermal waters had also a very beneficial influence. Dr. Kraus has not (as he should have done), included Bath among these thermals in his book. Many English patients, after a summer course at Carlsbad, frequently come to Bath during the winter months for their "after cure," and in nearly all cases derive decided and permanent benefit.

CHAPTER X.

. . . "which plenteously
The waters generated by their kinds."
Milton.

SARATOGA:—THE THERMAL SPRINGS OF VIRGINIA, & RICHFIELD SPRINGS, OSTEGO COUNTY, AMERICA.

The twenty-six springs at Saratoga, in New York County, America, are equal to, if they do not surpass, the European Springs, and of the fashionable immense crowds of people who are attracted thither for some few weeks in the summer, a large proportion go for water drinking. The waters are adapted to cases of dyspepsia, jaundice, biliary, visceral, and gastric congestions, and liver engorgements. Enormous quantities are drunk per diem from some of the springs. The waters are muriated alkaline saline, highly charged with carbonic acid, and principally composed of chlorides and carbonates. Some are also chalybeate. With few exceptions they are cold, being about 50° Fahr. The most popular springs are the Hathorn and Congress. The Hathorn is a remarkable spring, being highly charged with carbonic acid and contains large quantities of chloride of sodium, carbonate of lime, and

magnesia; also bromides and iodides of sodium, with iron as a bicarbonate. It is, indeed, a most potent water; the spring penetrates through sixty feet of solid rock, the water rising perpendicularly into the drinking hall. In its physical action it bears a strong resemblance to the spouting of the Sprūdel at Carlsbad, whence it issues from the solid rock in the bed of the sweet river Tepl. The Congress is the oldest and one of the most famous springs in America. The water is not so strong as that of the Hathorn, but it is aperient, highly carbonised, agreeable to the taste, and is largely drunk. Both these waters are largely bottled and are sold everywhere in America; and, as a curiosity it may be mentioned, that they are found universally in the *ménus* of the hotels.

The other springs are the Star, an iodine spring; the High Rock, the oldest of all, is strongly cathartic; the Red Spring, a chalybeate, alkaline water, containing lithia, certain forms of which are very valuable in gout and eruptive diseases. The White Sulphur Springs—not on the Saratoga Lake—are used for specific diseases. On Spring Avenue are to be found the Star, High Rock, Empire, Seltzer, and Old Red Springs. The Excelsior is a new spring abounding in iodide of sodium, with common salt, and is recommended for headache, dyspepsia, scrofula and skin diseases. Then a short distance from the city there are The Empire, Union, Champion, Columbian, Geyser, Kissingen, Saratoga, Vichy, and the Spouting Spring. The season extends from June 1st to September 30th. The bathing accommodation at present is inadequate.

Saratoga with its muriated alkaline saline waters is capable of being developed into a Kissingen, a Kreuznach, an Ems, or a Homburg. The German

Soölbader is there naturally, why is it not developed? It is a matter of surprise that so spirited a people as the Americans have not in the matter of their abundant system of mineral springs displayed more enterprise in their development. This surprise is increased, moreover, by the fact that the Americans make their springs not merely subservient to health, but the places where they are situate are the great resorts for pleasure and society. An enterprising syndicate or company, by the building of a grand series of baths, with all the newest and most appropriate European administrative appliances, might soon make Saratoga the finest watering place and health resort in the civilized world. The various springs rise in a valley which runs north and south for many miles through a series of elevated table lands. In the valley runs a geological "fault" affecting a large number of strata. The springs are well marked examples of *ascending springs*, the water of which is elevated by hydrostatic pressure, the difference of the composition of the springs being explained by accidental variations in the composition of the strata through which the waters pass. The geological strata of the county, as described by Professor Chandler, of New York, are highly interesting :—[1]

1. Hudson River and Utica Slates and Shales.
2. Trenton Limestone.
3. Calciferous Sand Rock.
4. Potsdam Sandstone.
5. Laurentian Rocks of unknown thickness.

These strata dip southwards, elevated ranges of Laurentian rocks appearing in the northern portion of the county, and the super-incumbent strata cropping out at intervals to the south, and running in

1 Walton on Mineral Springs.

parallel lines across the country; first the Potsdam sandstone, next calciferous sand-rock, then the Trenton limestone; lastly,—the southern half—the Hudson river and Utica slates and shales. At Saratoga springs an unusual disarrangement of the strata has occurred. By volcanic upheaval the strata above the Laurentian rocks have been entirely fissured through, the southern section being considerably elevated, the Potsdam sandstone on one side of the fissure, corresponding with the calciferous sand rock on the opposite side. The Laurentian rocks are gneiss, granite and syenite, which are almost impervious to water—the Potsdam sandstone and calciferous sand-rock immediately overlying, permitting it to pass freely. All the rain falling in the county, north of the fissure, except the surface water, permeates the different strata until it meets the Laurentian Rocks, thence it passes over the surface of those rocks until it reaches the fissure, whence it comes in contact with the unlifted ledge of rocks and then accumulates. From this fissure in the Laurentian Rocks, at an unknown depth, carbonic acid arises, the water being charged with gas; the accessories of water and the pressure of gas force the water to the surface and it then breaks forth in the various springs of Saratoga Valley; the Geyser spring, by hydrostatic pressure, being projected twenty feet above the surface. Altogether the Saratoga springs are most remarkable, their number, variety, and abundance being capable of supplying all home demands.

The Thermal Springs of Virginia.—These springs in the Alleghany Mountains must be mentioned. The chief of these are the Sweet Springs, of West Virginia, with their weakly thermal calcic waters, yielding 1200 gallons a minute, efficacious in cases of dyspepsia and

sterility. The Warm Springs of Bath, Co. Virginia, with a temperature of 98 Fahr., resemble Schlangenbad and Wildbad. The Hot Springs—six or more—with a heat of 110°, containing sulphur, magnesia, iron, and alum, similar to those of Aix-les-Bains, are prescribed for rheumatic gout, scrofula, cutaneous diseases, and diseases of women. The Healing Springs (within four miles of the Hot Springs) similar in chemical properties and effects to those of Ems, are prescribed in cases of dyspepsia, liver and skin diseases, and scrofula.

The Milboro Springs, the Bath Alum Springs, the Augusta White Sulphur, the Rawley Springs, the Orkney Springs, have each and all their distinctive properties, some containing sulphur, others being hot, and mostly thermal, are all being used with much benefit. The fine scenery and bracing air of these Alleghany mountain resorts, render them deservedly popular throughout America. The Hotels, although rural and simple in their arrangements, are essentially comfortable and desirable for those seeking quiet and repose.

The Richfield Springs in Ostego Co., within easy reach of New York, with a sulphur water at a temperature of 50 Fahr. only, are a most fashionable resort, and especially used for children. The air is dry and bracing and the elevation about 1,800 feet. Even in the height of summer the temperature is cool, the place being a most desirable residence for rheumatic patients; so much so, that many New York doctors have private convalescent homes there for their patients. It is, indeed, a charming locality, and the more so from the fact that Ostego Lake is within easy reach of it.

CHAPTER XI.

"If, brother Hyp, you want a cure,
At Bath, a lodging warm secure;
There drink the wholesome stream by rule,
When *nature's* stream runs low and cool."

Old Guide.

MEDICAL AND SURGICAL USES OF THE BATH THERMAL WATERS.

Drinking.—Drinking these waters medicinally is of considerable antiquity. Galen states that he never gave any mineral waters inwardly, although he acknowledges that they were so used; but for outward uses he held them to be highly efficacious, and all potentially hot.[1] Dr. Peirce, writing in 1697,[2] remarks:—"To the antiquity of their inward use this I know, that they were drunk long before any pump was set up, time out of mind for two purposes, viz., to quench thirst and to keep soluble, they that used the baths for cold distempers, as palsies and withered limbs, &c., who were forced to continue long in them and to sweat much, which rendered them both thirsty and costive, to both which the waters were known remedy for it had been long deserved, and is now very well known, that a draught

1 The word is used in Jorden's sense, namely, as powerful, and not in its present accepted sense.

2 Dr. Peirce began his professional career in 1653, and practically ended it with the century. The quotation is referred, of course, to the date of his book, but doubtless the experience it involves was the result of his fifty years practice.

or two of the Bath water quencheth thirst better and more effectual than double the quantity of beer or ale or any other useful beverage."

Peirce, it will be seen, confirmed in practice what the two earlier writers, Turner and Jones, advocated in theory. The former certainly never practised in Bath, and the latter gives little as to the results of his experience. In his work, "The Baths of Bathes Aide"—referred to in Part I. of this work—particular directions are given for the drinking of the waters, the time of day, manner, and quantity. To what extent the practice of drinking was carried there are slender means of knowing, but whether to a large or only a small extent, it is certain that they were scarcely ever prescribed by later physicians as a therapeutic agent until the time of Sir Alexander Fraser, physician to Charles II., in 1663, by Peirce and Guidott. The small drinking pump (shown in the margin of Van Hove's map) of the King's Bath, was erected at the instigation of Sir Alexander at the cost of the corporation.

When the waters are drunk fresh from the spring their immediate effects are to raise and accelerate the pulse, increase the temperature of the body, and excite the secretions. The tendency is to produce constipation when taken in small quantities; the older writers, however, mention their purgative effects, but the quantity they administered was sometimes as much as one, two, three, and often four quarts daily, which produced two or three copious evacuations. Their power of quenching thirst, and their effects on the urinary secretions were regarded as the best criteria of their importance and utility as an internal therapeutic. The *ordinary* quantity, namely, from six to eight ounces daily, tends to produce a regular action

of the bowels, whilst, as shown, the largest quantity will occasionally cause purging. The benefical effects of the waters are soon indicated by a glow of warmth in the stomach, increased appetite, improvement of the spirits and organisation, healthy secretion of the saliva, and an excitement of the urinary discharge very soon after they are drunk (the latter excretion being a most favourable symptom); and the rapidity with which they quench thirst. The older writers were all agreed on these points, and so far they differed in no respect from modern writers. If however, on the other hand, the water produce headache, throbbing of the temples, dry tongue, a sense of weight in the stomach, diminution of appetite, nausea and sickness, and do not promote the flow of urine, then it is clear, unless these symptoms can be obviated by other means, that they do not agree with the patient as an internal remedy, and must be discontinued. In many instances a modification of the uses of the waters may effect great changes in their operation, as for instance, in the diminution of the dose as well as the temperature, relinquishing their use before breakfast; or again, by mixing them in equal quantities with milk or warm whey, a practice commonly adopted in most German thermal watering places.

In certain forms of disease—as for example surgically in urinary disorders—the Bath waters have been found of late most useful when drunk in a cold state. Large quantities can be taken without producing the inconveniences that follow when drunk largely in their normal condition. In vesical catarrh the results are most encouraging, and are due probably to the highly charged lime-sulphated condition of the springs. Be the *modus operandi*

what it may, Bath mineral water in its cold state, *minus* its volatile constituents, will be found to have as great a therapeutic value as many similar cold springs of known great repute on the Continent.

Another method may, in certain cases, be employed with great advantage, if not with complete success, namely, the employment for a short time in connection with the dose of Bath water, some diuretic and laxative remedy, taken fasting early in the morning, such as Citrate of Lithia, or adding mild doses of Carlsbad Sprūdel crystals, Rubinat water, or the crystals of the Elizabethan Spa of Homburg. But if this alternate treatment, respectively, should produce no favourable results, it will be clear that no benefit can be expected from persisting in the internal use of the Bath waters.

The waters are effective in accelerating the peristaltic action of the intestines, removing viscid mucous secretions, soothing and invigorating the nerves of the stomach, healing erosions, and also in asthenic gout, when the stomach is irritable, and the nervous system below par, and when there is no active acute congestion of the portal system. The quantity of the waters drunk during the day under ordinary circumstances, should be divided into two portions—one of which may be taken before breakfast, or a little before noon, and the other at the end of the afternoon. The usual amount taken at one time varies from four ounces to half-a-pint. In cases, however, in which the smaller doses do not disagree, and when the system needs a "good washing out" the dose may be increased to double the quantity. When larger doses are prescribed it may be desirable that they should be equally divided, an interval of ten minutes being allowed to elapse between each portion, both in the morning and in the afternoon,

and as a general rule the drinker should *sip* the water as slowly as may be consistent with the retention of the heat. Any exception to this rule will in such cases be stated. The interval between each portion should be occupied in gentle exercise. As an invariable rule it may be laid down that the quantity of water prescribed should never be taken in a hurry or in large gulps. Nor is there any objection to drinking the waters on the same days when the bath or baths are used. At the same time a protest is here entered against the indiscriminate use of the waters, for two reasons: on the one hand it is calculated to bring them into disrepute; and on the other, many persons may be deterred from their beneficial use by unjust and undeserved prejudice. It may be broadly stated that in most acute inflammatory diseases the Bath waters should never be prescribed, while in the beginnings of the chronic forms the most happy results have been accomplished. It is found that the hotter the water is drunk the more rapidly it is absorbed; and this is especially so when it is taken before breakfast. Dr. William Falconer, wrote of the Bath waters as a stimulant, as an astringent, as a diuretic, as a diaphoretic, as an anti-spasmodic, as a detergent, and as a very copious purgative. As to the last he showed that the mechanical operation did not materially differ from common water, but when the action on the nervous system was considered, the variation was more evident.

There is no reason to believe that either the quality or the quantity of the Bath springs has varied since the time of the Romans. The waters are of a bluish colour, organically pure, as shown by Mr. Ekin in his analysis recently made for this work. It may be remarked, parenthetically, that

at Bath, the quantity now generally drunk compares very favourably with the consumption of waters at Homburg, Kissingen, and Carlsbad, large as it is. It would be unwise to speculate on the special effect of the chemical salts in the Bath waters. Thus their chemical condition must be taken as a whole, and by their clinical value they must be judged. Long experience in the close observance of results should testify to their worth.

It may be well to enumerate some of the forms of disease in which the waters are internally useful, namely, gout and rheumatic affections, certain forms of chronic skin diseases (especially if gouty); and in the various irregular manifestations of gout, such as gastric and intestinal catarrh, dyspepsia, acidity of stomach, biliary obstructions, certain forms of anæmia in females, nervous debility, the debility also which follows in most acute diseases, and visceral catarrh. Cases, on the other hand, in which the Bath waters should be avoided are lung disorders, asthma, erysipelas, exanthemata, apoplexy, epilepsy, hemorrhages, cancer, general plethora, acute congestions running on to high fevers.

A course of the waters is usually prescribed for three weeks. Diet obviously must depend on the condition of the patient and the nature of the case. Whether a liberal or restricted diet be ordered, whether food should be light and easy of digestion, or more substantial, whether meats, fish, game, or fruit, are desirable, whether stimulants or other fluids and how much or how little be demanded. All this depends upon the case to be treated; but for the numerous gouty patients white meats are preferable to red, and in most cases green vegetables well cooked are most proper. Saccharine compounds, ferment-

able drinks, and free acids should be avoided. Alcohol alone does not develop the weak points of the gouty diathesis. The gouty dyspeptic is recommended to masticate slowly and to adopt the American plan of eating food dry, and drinking the bulk of his fluids at the end of the meal. To those people who, from habit, or from the nature of the case, may have to drink large quantities of hot water frequently, it may be said for their comfort, that it has a happy effect on the metamorphosis of the tissues, insomuch, that when the amount of water drinking is increased, especially in connection with, or immediately after food, the urea eliminated is increased to an extent beyond that which can be explained by the increase of absorbed fluid enlarging the facilities of urinary excretion.

CHAPTER XII.

" This course observ'd, will thousands save
From pain, from anguish, and the grave.
Pills nature vex, and weaken too,
These rules of health the man renew."

Old Guide.

THE BATHS IN THEIR VARIED MODES OF APPLICATION.

The daily yield of the springs amounts to over 500,000 galls. of mineral water.

Bathing.—General remarks. When the waters are used as a bath the bathers on first entering the bath often experience a shock, accompanied with chilliness; this, however, soon passes away, and is succeeded by a grateful sensation of warmth. This shock, or thrill—due to a temporary jerk or spasm of the heart—is momentary, and a matter only of mere physiological interest. To lessen this effect a warm cotton wool cap should be worn during the immersion. It is found, practically, that by keeping the head warm and dry the regularity of the cardiac action is pretty well maintained. This especially applies in the use of the deep, reclining, and crane

chair baths. The frequency of the pulse and the temperature of the body are increased, and as a consequence the amount of the urinary discharge augmented. After the use of the bath there is a consciousness of increased elasticity and vigour of frame, the appetite is improved, and the exhausting perspiration and fainting which often follow the use of warm baths of ordinary water, rarely if ever occur after the mineral bath; nor again is its use under ordinary circumstances productive of the copious perspiration consequent upon common hot baths. In cases of rheumatism, in which the limbs are stiffened or contracted, the power of using them is restored, whilst in other cases the power is regained with remarkable quickness. In certain cases of palsy, the employment of the bath is attended with similar results. In sciatica the pain is often relieved during the process of bathing, and though at first the stiffness of the limbs, as well as the pain, often return soon after leaving the bath, yet it will be observed that the recurrence of pain or stiffness gradually ceases, and finally the symptoms disappear. There are cases in which bathing, whilst *not* disagreeing, yet is not productive of any appreciable effects; and when this is so it is advisable for a time not to persevere. It frequently happens after such cessation that recovery follows. When, however, this result does not occur, bathing may be resumed with manifest advantage. After the withdrawal of the stimulating effects of the waters, nature reasserts itself, and permanent recovery may ensue.

When the use of the bath is attended with marked redness of the skin, flushing of the face, throbbing of the temples and giddiness, the temperature of the water should be lowered, and the period for employ-

ing it diminished—until both are adapted to the requirements of the case. If after taking these precautions, similar effects be still produced, it will be evident that the use of the water in these cases must be relinquished.

Under ordinary circumstances the temperature of the bath should not exceed 95° or 97° Fahr. A higher degree of heat ought never to be resorted to except by special direction. The time for remaining in the bath, when used for the first time, should not exceed ten or fifteen minutes. A disregard of this simple rule is often attended with inconvenience, causing giddiness and flushings of the face. On the other hand, if no discomfort is experienced, the time of the Bath may be as long as twenty minutes or even half an hour, when the effect is agreeable. Before entering the bath room it is advisable that the vapour which has collected during the preparation of the bath should be allowed to escape; the bather should then descend gradually into the bath, and on leaving it be enveloped in a warm sheet covered with a warm blanket, the sheet aided by gentle friction absorbing the moisture from the body; and when this has been done the sheet should be allowed to slip down, and the warm blanket then pressed round the person. The bather may then return to the dressing-room, and submit to a vigorous rubbing with warm towels.[1]

When it is considered necessary to promote perspiration the bather should, on being enveloped in the sheet and blanket, immediately proceed to the dressing-room, recline on bed or sofa, and being wrapped in one or two warm blankets remain for about

1 All linen is found by the Bath authorities.

fifteen minutes. Great care should be observed by bathers on leaving the open bath. If the weather permit, they should walk for a short time after the bath, or else return home in a covered vehicle, especially if ordered at once to go to bed. The best time for taking a bath during the summer months of the year is early in the morning, especially for those who are strong. It may, however, be observed, that any other hour may be chosen so that it be not immediately before or after a meal. Under ordinary circumstances the bath may be taken three or four times during the week.

These remarks must be regarded only as general rules to be observed in the use of the waters, either for bathers or drinkers; the peculiar circumstances of individual cases must determine to what extent a deviation is desirable or indispensable. Some persons, as experience proves, can use the waters with seeming recklessness, without experiencing any injurious effects; but it does not follow that in every, or even in the majority of cases, it would be wise to incur any risk, when it may be avoided by the observance of simple rules.

The foregoing general remarks are for the most part the embodiment of the opinion and practice of the late Dr. Randle Wilbraham Falconer, as set forth in his "Manual of the Baths of Bath."[1] Since Dr. Falconer's decease, the great *desiderata*, in the bathing system of Bath, have been called into existence, elaborated, and perfected. These will meet a want

1 The rights in that work, the author, as stated elsewhere, has acquired, and as far as possible, has incorporated the most valuable portion in this work, with such modifications and amplifications as time and circumstances have rendered necessary.

long felt, and in connection with this great acquisition, the author in these pages has endeavoured to afford such information and instructions as may render such acquisition generally of the greatest practical importance.

Douching.—The Douche is more stimulating than the ordinary bath; and it has been pointed out by Fleischner that the former acts as a lymphatic stimulant, promoting absorption of chronic inflammatory products and specific exudations.[1] Dry pumping, dry douche, and wet douche (or the under current), are very favourite modes of treatment in Bath. They were originally instituted by Dr. Jorden, under whose direction, to ensure their success, pumps were first erected. Previous, however, to the pumping process, "bucketing," or the "douse," was the only mode practised; this was simple enough: two of the tallest and strongest guides stood in the bath with a bucket over the patient, upon whom, or the parts affected, they poured the water with great force. The Romans used something similar to the douse as a mode of external bathing. Spry describes the pump thus:—"The water was taken up and poured on the head and particular parts from pitchers and urns, from a greater or lesser height—in some cases the bathers came out of the hot water, were anointed and rubbed (probably a species of massage) and returned—in others they did not go into the water, but sat down by the side of the bath, and had the hot water poured on them."[2] (See illustration.)

---

1 *Vide* Handbook of Medical Sciences, vol. 1.

2 *Vide* Sutherland's Map of Roman Baths. Illustration of bathing at Pompeii and Herculaneum.

The Dry Douche.—This, as now used, is a powerful agent for good when judiciously applied. It is adapted to local complaints—chiefly of joints, the part to be douched being laid under the rose, the force of the water spray being graduated to a nicety—*i.e.*, a quarter, third, or half strength, as may be deemed necessary. The duration of the process and the heat of the water are determined according to the nature of the case. The temperature is rarely ordered over 100 Fahr., the time not often exceeding ten minutes. Cold, tepid, or hot dry douches, may be had at any given temperature, and may be taken at any period of the day—the forenoon, however, is suggested for them. A few minutes application usually suffices, but exceptional cases may require twenty minutes and occasionally longer.

The Wet Douche or Under Current.—This is used after the bather has already for awhile been in the bath. Usually during the last five minutes spent in the bath, the hot water, at about 100 Fahr., is turned on under water, through a tube with nozzle, and directed from a short distance on to the part to be douched. The process is applicable for the most part to certain affections of the abdomen and to local affections of the joints, and nothing can exceed the relief and comfort such applications afford. The resistance of the water necessarily breaks the force of the spray, but it is quite powerful enough for the purpose. After the douche the patient should leave the bath without delay. This wet douche treatment is carried out in the ordinary deep as well as in the reclining baths in all the establishments. The Wildbad bath, at the massage baths, is most complete in the arrangements necessary for douching.

The Douche Ascendante.—This douche is arranged chiefly on the Marlioz principle at the New Massage

Baths. It may be used at any period of the day. In cases of leucorrhœa, interrupted and painful menstruation, it constitutes a valuable auxiliary in restoring healthy action. In uterine congestions water up to 120 Fahr. can be had if desired. It is a subject of regret that English visitors do not avail themselves more commonly of this kind of treatment. At Marlioz and Aix the Douche Ascendante is used with great results, the rooms being usually crowded, every possible convenience and appliance being provided. Analogous provision is made in Bath for promoting this important system of bathing in connection with the hot mineral water, with skilful attendants.

The Aix-les-Bains Massage Douche.—This douche is a very special feature in the Bath system. It is constructed on similar lines to those at Aix, and is acccssible to patients all the year round. From the nature of the climate, however, during the winter months, the massage douche cannot be given as at Aix during the season, the early morning being there the favourite time, which allows the invalid to have a long rest before breakfast. This in Bath during the summer months is practicable, but during the winter from two to six in the afternoon is the proper time. For the weakly the morning is always best. But in such cases the patient should have a light breakfast previously, and about an hour after returning from the bath a light *déjeuner*. Moreover, it may, as a rule, be regarded as expedient that such patient should go to rest for an hour, or more if required, not necessarily to perspire, but rather to cool, rest, and recuperate.

The Maillot can, of course, be carried out perfectly when it is considered necessary. Three Aix douches can be taken during the week; the

stronger sometimes may take four or five. In order to avoid the consequences of a sudden change of temperature it is enjoined upon all patients, without exception, to promenade (at any rate for a short time) in the cooling-hall. It is scarcely necessary in bathing of any kind, especially in hot bathing, to point out the susceptible and altered condition of the functions of the skin.[1]

In Bath there are many interesting and picturesque excursions to be made by the strong and robust, and the high hills and table lands surrounding the city should be sought. This, during the water treatment, is of great moment. Stiff and grating joints, nodosities, gouty and gouty-rheumatic enlargements must not be allowed to rest quietly, exercise being an imperative necessity, in all such cases, unless the patient wishes to invite chronic and incurable anchylosis.

The Massage Douche and its Administration.—The administration of the douche must necessarily vary according to the nature and severity of the disease, its duration, strength and complications, and the immediate state of the patient. The physician will define the minute and necessary details of the treatment. It is indispensable in some cases to give a massage douche at 96 Fahr.; in others at 100 or 102. No definite line can possibly be laid down; it must be for the medical man to determine. For example, a rheumatic convalescent, with cardiac complications, requires great delicacy of treatment, the heat not exceeding 97, the administra-

1 Flannel or Jaëger's clothing, especially the night dress, should be worn. On the "off days," when no bathing or douching is going on, regular walking exercise should be taken by patients who are strong enough, and carriage or chair exercise by the less robust. Flannel dressing gowns or *Costumes de Bains* should be used by ladies leaving the bath, when the Maillot is ordered after the Aix douche and natural vapour bath. For gentlemen flannel suits will be found most useful.

tion gentle and limited in duration. Cold showers, together with general exposure, must be avoided. On the other hand old chronic rheumatic joints can bear a high temperature—102 or 104 Fahr.—strong massage, friction, and prolonged douching. In these cases patient and persevering efforts are necessary. A course of three weeks or a month twice a year for massage and deep bathing in such cases may be needful. As a rule it may be observed, that wet, as well as dry massage, assiduously applied, is calculated to produce marked improvement. In connection with the massage system, there is, as at Aix, a *Bouillon*, or general vapour bath, annexed to a douche, or douches in which invalids can have a natural vapour bath, followed by the thermal douche or the cold douche, in conjunction with massage when necessary.

The Berthollet, or Natural Vapour System.—These are general and local. Therapeutically the system now introduced may prove to be one of the most important in the new bathing arrangements. It can be applied with or without the tepid shower bath. The great value consists in the fact that the chemical constituents of the mineral waters are absorbed into the system by the skin in this way, and thus their value is incalculably enhanced. Some of the subacute and chronic forms of Eczema, in which bathing is forbidden, are treated by the natural vapour with admirable results. The invalid suffering from anæmia, sometimes contrary to previous experience, bears the vapour well, especially if the anæmia has arisen from tropical fevers. In the latter case the vapour has proved successful after large courses of arsenic, iron, cinchona, and quinine have proved of no avail. The jaundiced looking patient, saturated with malarial poison, will by

perseverence derive benefit from the *Berthollet* alone, which in reality may be regarded as the *Absorption Cure.* In cases of acute gout the limb, if it be the arm, is put into the drum; if the lower extremity, into the opposite tube. In each case it is steamed twice or three times a day for a definite period, swathed in absorbent wool, and then bound up firmly with a Domett's flannel bandage. In the space of forty-eight hours great relief is experienced, and usually it is followed by a marked and general subsidence of the attack. In cases of old chronic joints, gouty or rheumatic, synovitis,—chronic or subacute,—recent sprains, indurated tissues, after fracture or contusions, the vapour bath is the best treatment. It should, however, be pointed out that (with some surgical exceptions) no joint or limb having a tendency to inflammation should go into the waters, but into the natural vapour *alone.*

The utmost candour will be observed with regard to the vapour treatment for acute gout. The timid and others, whatever may be their preconceived notions on the treatment of acute gout, need have no fear of the gout flying to other parts as the result of the vapour treatment. The inflamed skin and underlying tissues become macerated with the natural vapour, whilst a kind of exosmosis and endosmosis ensue. Absorption takes place, and, by keeping the inflamed tissues rigidly covered with absorbent wool, firmly supported by a soft bandage, the process for a time is continuous—the pain, swelling of the limb, and acute tension, subsiding. Nothing can be more reprehensible than the laxity and recklessness sometimes shown in the treatment of gout. A patient with tender feet, tender fingers, and other analogous local symptoms is often told to take "a hot bath to bring it out."

This is downright empiricism as well as cruelty. The patient "takes a hot bath," and the effect is to "bring it out all over" with a vengeance. The attack which might and ought to have been confined to the locality at once becomes general, and in the most violent form. This is no imaginary case. The waters are good for the gout, *therefore* always plunge a patient in to the bath regardless of all concommitant symptoms, and then it is found that the remedy is worse than the disease, and if the life of the patient is not endangered, great suffering, which might be spared, is inevitable. A steam *Berthollet*, general or local, according to the acuteness and extent of the symptoms should have been used in this type of gout.

Even with the comparatively limited appliances appliances under the ordinary bathing system, cases of this kind might and ought to be treated locally, *i.e.*, without deep immersion. Now the remedial appliances are invaluable. The local parts affected may be dealt with by the physician by the *Berthollet* with almost mathematical precision, according to the symptoms manifested, and the locality affected.

Again, there are appliances for various local parts of the body, namely, the shoulder, the back and loins, the hip, knees, legs and ankles, arms, wrists, and fingers. In these local cases a tube of waterproof sheeting surrounds the limb under treatment, preventing any discomfort by the accidental escape of the steam. Persons suffering from adiposis, athletes, hunting, and riding men, to whom diminution in weight is important, may resort to the *Berthollet*.[1]

1 A case in point; by the incidental *Berthollet* treatment, and whilst engaged in his ordinary pursuits, a gentleman rider reduced his weight 7lbs in the course of five days.

In cases of lichen planus, acne, psoriasis, and senile prurigo, the advantages of the thermal vapour over the ordinary application of the hot mineral waters are very marked. In the latter disease the intense irritation is materially relieved by the vapour; and, as a rule, it may be used very generally, provided the circulation is capable of bearing the increased blood tension which occurs during the bath.

The Reclining Bath with Wet Douche or Under Current, Wet Massage, and Dry Massage.[1]—This is a special feature at the Massage Baths. The invalid is first massèed in a reclining bath under water by an expert attendant for about two thirds of the time allowed for the bath; the remaining third is occupied by the administration locally, of the under-current at a temperature varying from 100 to 104 Fahr., and the best possible results are produced by these combined methods of treatment. It will be well to remind the reader that the two forms of wet massage in use at the baths of Bath are the massage in connection with the Aix Douche, and the massage under-water in the reclining, or in exceptional cases in the deep, bath. A considerable number of invalids who cannot bear the force and volume of the Aix sprays, find the latter method less fatiguing and it is frequently used at most of the German spas.

Sits Baths.—This form of bath is provided, and can be used with or without the *Douche Ascendante*, or with the *Lavement*. The lavement is generally used with marked effect before breakfast, and it may be also used an hour or two after that meal. In

1 Dry Massage is administered at the invalid's home, not at the baths.

cases of habitual constipation, and where the regular action of the bowels has been, from whatever cause, disturbed, the lavement is of inestimable service. It may be observed, *en passant*, that the time at which the douche of all kinds, and the lavement should be used depends very much on the circumstances of each individual case.

The Marble Bath.—The marble bath at the Royal Baths is commonly used for the administration of various medicated baths. These baths are composed in accordance with the formulæ of mixing a recognized number of litres of the Mutterlauge of Kreuznach, a concentrated fluid abounding in muriated salines, bromides, and iodides, to the Bath mineral water. Water is produced such as is used at Kreuznach, which gives off free bromine and iodine. The Mutterlauge of the German Sööl-Baths can also be used in the same way. In this manner the bather can derive all the advantages of certain Continental baths which are inaccessible during the winter months.

Cases of uterine fibroids and the varied forms of struma which exist so commonly among young people—as well as certain other forms of specific disease—are in this manner successfully treated during the cold months of the year.

Swimming Baths.—These baths, both at the Royal and the Hetling baths, have a temperature of about 84 Fahr., and are fully described in the historic part of the work. They are used for pleasure, but are chiefly most useful in disorders incidental to the period of puberty with young females, besides certain forms of sub-acute and chronic rheumatism, and for other hygienic purposes.

The Crane Chair.—This is a chair fitted to the deep baths at all the bathing establishments, to

enable the crippled and helpless invalids to take the bath in comfort. It is arranged so that the undercurrent is facilitated and utilized.

Reclining Baths, on the Vichy pattern, and *The Bouillon* or general vapour bath, with douches hot or cold as at Aix, are provided at the New Massage Baths.

Needle Bath.—The needle bath or *Douche en Cercle* is provided at the new massage baths. It is not necessary to enter into any details beyond saying how useful it is in various forms of functional disorder, in ordinary cases of hysteria, and general neurasthenia.

The two large Inhalation and *Pulverisation Rooms* (*Salles de Pulverisation et Inhalation*). These two large rooms are fitted with various ingenious apparati, and are supplied with cold and thermal water, in the form of Siegle's sprays, similar to those at Marlioz. Pulverising and atomising in various forms, are carried out; also the *Humage* or apparatus for the inhalation of the thermal vapour as at Aix and the gases of the hot water, are inhaled in the same manner as at Lippspringe in Westphalia. An Umbrella Spray, on the lines of the one at Marlioz, will also be added. Chronic bronchial, laryngeal, and pharyngeal catarrhal diseases will find great relief from its use. In chronic cases with bronchorrhœa arising from dilated bronchi the inhalation and pulverisation process will be found highly beneficial, and the same process is productive of relief and comfort in cases of disease of the throat, nose, respiratory pharyngeal passages, and similar affections.

CHAPTER XIII.

Medici, causa morbi inventa, curationem inventum protant.
Cicero.

DISEASES IN WHICH THE WATERS ARE BENEFICIAL.

It is proposed to deal with certain diseases which may be advantageously treated by the Bath thermal waters, and briefly to point out the indications and counter-indications during the adoption of the course.

The following diseases are suitable for thermal treatment :—

Rheumatism.—Including acute rheumatism; sub-acute rheumatism; chronic articular rheumatism (Garrod's rheumatoid arthritis; or the rheumatic gout of Fuller), and the types as defined by Charcot, namely, chronic progressive articular rheumatism or arthritis deformans; partial chronic articular rheumatism; Heberden's rheumatism. Then again, sciatica, neuralgic rheumatism, lumbago-myositis or muscular rheumatism, and the so-called rheumatic diathesis.

Gout.—Under this head is included acute, sub-acute or chronic gout; atonic gout; gouty dyspepsia; gastralgia; neuralgia; skin diseases, and other irregular manifestations of gout; as well as the uric acid diathesis.

Disorders of Digestive Organs other than Gout.

Diseases of the Skin.

Anæmia, Chlorosis, and Malarial Cachexia.

Diseases of Women.—Including interrupted and painful menstruation; leucorrhœa; sterility; uterine catarrh; chronic inflammation of the ovaries; uterine fibroids, and hysteria.

Palsy.—In its local and general as well as varied forms (excepting the acute stages); namely, hemiplegia; special paralysis; locomotor ataxy: facial or Bell's paralysis; hysterical paralysis; diphtheritic paralysis; paralysis arising from metallic poisoning (such as lead, arsenic, mercury and copper); Scrivener's palsy, and progressive muscular palsy.

Chorea.

Syphilis, Gonorrhœa, or Urethral Rheumatism.

Women after Accouchement (ordinary); convalescence from protracted illnesses, such as albuminuria; white leg; diphtheria and typhoid fever.

Diseases of the Respiratory Tract—Such as chronic bronchitis; bronchorrhæa; asthma; chronic laryngitis and pharyngitis; and general catarrh of the mucous tracts.

Surgical Affections.—These comprehend the results of fractures and dislocations; gunshot wounds; caries and necrosis of bone; strumous joints; white swelling; ulcers; fistula; hip-joint disease in its early stage; synovitis; cellulitis; false anchylosis; sprains; contusions; stiffness of tendons and muscular contractions; tumours; catarrh of the bladder; hypertrophy of the prostrate; hepatic or renal calculi; wry neck; to which also may be added diseases of the ear and nose, and general weakness of limbs after injury, as well as gout in in its surgical relations to the human economy.

matic endocarditis may be signally benefited, there is no doubt, if the patient promptly has recourse to the waters after an acute attack. Experience abundantly proves that cases, deemed unsuitable, owing to the presence of mitral murmurs, have been successfully treated; and it may be assumed that in many instances *at first sight* damaged hearts are the result of exocardial and functional derangement, rather than structural mischief. In these cases Dr. Wilbraham Falconer insisted on the very careful use of tepid baths and douches; since his death, however, the development of the massage system has provided a safer and a more desirable method[1]; and this, whether it be the Aix douche or vapour or the tepid reclining bath, should be used with care and discrimination. The usual temperature of the massage douche to begin with should average from 92 to 95 Fahr., and the duration should not exceed five or six minutes, the force and volume of water being gradually diminished. Gentle massage should follow, the region of the heart and lungs being avoided. As the invalid grows stronger, and is better able to bear it, the length of time may be increased, and he may take a course of twelve to fifteen massage, three or four Berthollet vapour, and from four to six warm reclining, baths, with the hot douche or under current to painful joints. This complete course may be carried on for a period of six or seven weeks, it being practically found that at the most, three Aix baths should be taken during the first and second weeks; as to the remainder of the course, no hard and fast line being laid down, it must obviously be determined by the nature of the case. In ordinary cases, to begin with, the *Berthollet* should last from four to five

1 Dr. Falconer, it may be stated, was a consistent advocate of the Aix-les-Bains treatment of acute rheumatism.

minutes, and the tepid baths from six to eight minutes, and this under ordinary circumstances will be well borne. This type of invalid should not be subjected to the profound sweating process. The Maillot in such cases may be used in order to avoid exposure to chill. After the douche the patient should go to bed, the body being lightly covered, and after a short rest nourishment should be taken.

No form of bath is recommended in cases of aneurysmal dilation of the aorta or in long standing cases of aortic regurgitation and atheroma of the blood vessels. In that type of irritable heart peculiar to highly nervous persons, especially females, in whose minds there exists a latent undefined dread of "something going to happen" (even without any evidence of structural disease) the Aix douche or bath should not be recommended. But in this class of invalids the local mechanisms, as they have been described, are admirably adapted to give relief and to inspire confidence, and when this has been brought about, even after grave cases, the Aix douche may be used with confidence. *A fortiori*—in sub-acute rheumatism, similar but more active and powerful treatment must be adopted.

Chronic Articular Rheumatism or the Rheumatic Arthritis of Garrod and the Rheumatic Gout of Fuller.—Charcot points out that the chronic form of this disease is *sometimes* seen at the bedside, and proceeds from the acute form; the fact, however, remains that in most cases it is developed spontaneously. Charcot's classification is a safe one to follow, although it is almost impossible to make an actual distinction between the various forms of rheumatism, whilst there is no difficulty in showing that they proceed from the same cause; yet they are

essentially distinct from gout proper. Charcot further observes "that it is chiefly to morbid anatomy any scientific classification can be made—the unity proven—and the crucial distinction defined. In gout, for example, a fundamental fact exists which governs all the symptomatic manifestations of the disease—namely, the change in the blood due to an excess of lithic acid." In chronic rheumatism, however, there is no such characteristic indication. And although it is probable that a special modification of the fluids in the economy may operate in rheumatism as well as in gout no proof of it has been adduced. Therefore, continues Charcot, although chronic articular rheumatism appears in various garbs, and in appearance very dissimilar, yet they are various forms of one and the same affection.[1]

The following types of chronic articular rheumatism are especially referred to:—

Chronic Progressive Articular Rheumatism.—This is the gouty and nodular rheumatism of certain authors. The primary asthenic gout of Landrè-Beauvais, and Haygarth's nodosities of joints, which usually develope at the menopanse or later. This is the arthritis deformans of most writers. There are two kinds known sometimes as *primary*, sometimes as *secondary* to the acute, and may be either benign or malignant. The disease is *sui generis*, and usually begins in the metacarpal phalangeal articulations. It is frequently manifested in cases of suspended menses in girls, in young married women after miscarriages, or in cases of prolonged labour, and very commonly with women at the climacteric period. Visceral diseases are very common complications. There are but few intermissions, no remissions, and the disease is essentially progressive.

1 Clinical Lectures on the Diseases of Old Age, by Drs. Charcot and Loomis, translated by Dr. Leigh Hunt.

The local changes are those of a dry arthritis giving rise to distressing consequences.

In these cases too much must not be expected from the use of the waters. In the early stage of the disease, however, many good results have followed by firmly treating the nodular joints as an expression of simple rheumatism. The invalid, therefore, in the early stage, may derive benefit from the Aix douche, frequent hot douchings, vapour baths, persistent massage, with assistive and resistive movements. The use of some of the forms of Zander's apparatus and regular Faradisation may produce considerable benefit; but if the disease be in an advanced stage only palliative means can be adopted, much having to be left to the courage of the invalid. The best treatment, beyond all doubt, is the natural thermal vapour, with its various local apparati.

Partial Chronic Progressive Articular Rheumatism.—This is the nodi-articular rheumatism of Adams, the real arthritis-deformans which may be either acute or chronic, and is commonly seen in its gravest form, *i.e.*, *morbus coxæ senilis* of middle age. It is a serious infirmity rather than a disease. Visceral complications are infrequent, but skin diseases, such as psoriasis and asthmatic complaints are common complications. This form of disease occasionally simulates a dislocation, a fracture, or a white swelling, and is often difficult to diagnose. It then becomes a matter of the deepest interest in surgery. It will be necessary in connection with this matter to remember what is said in a previous chapter as to the importance of early treatment, which applies with equal force to the present.

Heberden's Rheumatism.—This is the mildest type of the disease and in this nodular form the distinction

between it and gout is well understood. It is associated with asthma and megrim, and occurs chiefly in women from twenty to thirty, and from about the menopause to the senile period of life. The disease usually attacks the second articulation of the fingers, which become deformed; the development is slow and of an indolent character, but it is often accompanied by sciatica and neuralgia.

All forms of chronic articular rheumatism first show themselves upon the synovial membrane which becomes vascular, the synovial fluid being increased, and is followed by velvety changes in the structure of the cartilage, with subsequent eburnation of bone. In these cases prolonged inaction leads to atrophy of the bone structure and exceeding friability of the tissue. There are various grades of chronic articular rheumatism, but they are all special forms of one and the same affection. It may take the form of mild or severe, unilateral or bilateral, affecting a single joint, or many joints. *Charcot* points out that there are many varieties of the same family; sometimes Heberden's rheumatism, at other times it may be of a progressive or a partially progressive character, or an admixture of them in the same individual, a striking proof of the unity of the rheumatic lesions. The disease is hereditary. Arthritis-deformans differs very materially from the other chronic arthropathies of *Charcot*, such as the scrofulous, syphilitic, and gouty arthropathies.

In Heberden's rheumatism early treatment by the Bath waters, with persistent massage, does much but if the deformity is extravagant, then all the *armamentaria* of the water establishment must be brought to bear. In the advanced stages water treatment would be useless.

In chronic articular rheumatism endocarditis and pericarditis sometimes occur, with the same characteristics as in acute rheumatism, but they are recognised as of a less serious nature when they appear in the former case. This will explain many of the heart conditions found among water patients past middle life, who have never suffered from rheumatic fever. In these cases, unless aortic regurgitation be present and the pulse intermittent, notwithstanding the presence of well defined cardiac bruit, they may be successfully dealt with by some of the forms of water treatment.

Sir Alfred Garrod[1] remarks that with patients who have submitted themselves perseveringly to a natural course of steady restorative treatment, he has become more hopeful year by year in the treatment of chronic rheumatism. On the other hand, many who are the dupes of empirical advisers become incurable and miserable cripples. He also points out that many, even in crippled conditions extending over many years, regain partial mobility of the impaired articulations and locomotive power to some extent. This is due to the formation, so to speak, of false joints by a process of eburnation of the ends of the more important articulations.

Sciatica.—In cases of sciatica, arising from cold and wet, the Bath waters have from the earliest historic times held a high reputation. In the acutely painful stage, the simple bath at first perhaps only is borne, succeeded by the warm under current. If the patient be debilitated a plain swimming bath at 84 Fahr., may be good. Then, if the case be of long standing, the dry douche, reduced materially in force, followed by the large Aix massage douche, should be tried. Massage cannot be recommended

1 On Gout and Rheumatic Gout.

in the exquisitely painful stage, during which tepid baths can only be used.

The Gouty form of Sciatica.—The Bouillon will be found most serviceable in this form of disease. A vapour bath, followed by a warm douche, or an occasional hot bath, with the under current, will be found desirable. It will be necessary to diagnose how far an arthritis may be present in bringing about this condition, such as the commencement of *morbus coxæ senilis* in middle and advanced age (as the case may be), or an acute inflammatory condition of the sheath of the sciatic nerve, due to lithic acid. Drs. Brachet and Blanc[1] of Aix, lay great stress on the necessity of defining if possible at the onset the cause of the neurosis. Real sciatica, they assert, derives great benefit from a vigorous course, whilst its counterfeits are intensified under a similar treatment. In syphilis other specific measures must be added to the course. The Berthollet, general and local vapour, with judicious massage, will be found of great use in promoting a final cure.

Neuralgia or Neuralgic Rheumatism.—In this painful affection the waters in the form of a douche or vapour bath, are extremely serviceable. Young women in whom the disease has induced habits of indolence, will find the swimming bath, at 84°, of much service. If the case be one of unusual obstinacy, then the warm reclining bath, wet douche, and the Faradaic current will, as a rule, be effective remedies.

Lumbago.—The dry douche in these affections is usually recommended, and is very potent; the force, however, requires careful regulation. If the large Aix massage douche cannot be borne, quiet immer-

1 Mineral Waters of Aix les Bains.

sion in a reclining bath, the hot under current being applied to the loins at short intervals, is good, and to these, in certain cases, massage under water in a reclining bath will produce the most satisfactory results. This class of patients, more especially the gouty ones, may require some Carlsbad sprüdel crystals dissolved in the first (fasting) glass of hot mineral water. When dry massage can be borne with strong friction it is desirable to apply it.

Muscular Rheumatism.—As a rule these cases will require the Aix massage douche, together with the dry massage, and if these fail to give relief the Berthollet vapour and the massage reclining bath should follow. The Bouillon also will be found a very useful bath in many cases.

CHAPTER XIV.

Hygeia broods with watchful wing
O'er ancient Baden's mystic spring.

T. Warton.

GOUT.

Gout.—In latent gout the use of the warm mineral bath will induce *a fit of gout* in a very short space of time. How far this mode of treatment is desirable is another matter. By frequent repetitions of acute attacks, the disturbance of the digestive organs and liver greatly distresses the sufferer during the intervals between the paroxysms. Frequent attacks of gout in latent cases induce serious lesions of the heart and kidneys, and tend to shorten life. Acute gout, says *Charcot*, is but the paroxysmal exacerbation of a primarily chronic disease, chronic gout; once gout, therefore, always gout. Gout, however, in an unique state of constitution, known as the gouty diathesis, is essentially a specific disease, as seen by the marked changes that take place in the structure of the joints due to the presence of sodium urate, running a definite course, although presenting widely different aspects, and causing a large number of varied symptoms and complications. It has been already shown that in the rheumatic patient the serum of the blood is known to be alkaline, the blood discs are diminished in proportion as the fibrin is

found to be in excess, although the proportion of urea is normal, and there is no excessive increase of uric acid. These facts pathologically mark its distinction from gout. *Garrod* has shown that in gout excess of uric acid is the most prominent and characteristic change in the blood. *Charcot* deposes, also, that in cases of *acute* gout, the blood discs are NOT diminished, although in chronic gout they are lessened and anæmia is marked; whilst in acute gout as well as in rheumatism fibrin is increased. In chronic gout the albumen of the blood is diminished, if there be any kidney mischief, and the urea is not eliminated, and the alkalinity of the blood being diminished, favours the development of chalk stones. The deposit, therefore, of urate of sodium being peculiar to gout, and never occurring in rheumatism, leads Sir Alfred Garrod to the conclusion that it is the cause and not the effect of the inflammatory symptoms. It is found not only in the joints within and without, but in the gouty diathesis, in atheroma of the blood vessels, in the bronchial tubes, in the expectoration of gouty bronchitis, and most marked of all in the kidneys of gouty subjects, giving rise to albuminuria.

In a healthy man about 8 grains of uric acid and of urea about 1 ounce (480 grs.), are excreted per diem, the average being about 1 to 56. Their relations and quantities depend upon the quantity of animal food taken, except in cases of imperfect metamorphosis of tissue; on the other hand moderate exercise decreases the quantity, whilst excessive exertion produces the opposite effect. After copious draughts of water a decided diminution of uric acid has been observed, the urea having been increased. The inhalation of oxygen is usually followed by the disappearance of uric acid from the urine. The

alkaline carbonates, with the sulphates, when drunk as mineral waters, especially if taken in conjunction with a little common salt, diminish the uric acid. In febrile states the uric acid and urea rise and fall together, and an increased excretion of uric acid occurs whenever there is decreased energy of the processes of oxidation in the body. In Leucocythœmia the uric acid is enormously increased, whilst in anœmia and chlorosis it is reduced in quantity, unless there be dyspnœa, in which case it is increased. In all chronic affections, with dyspnœa affecting the respiratory and circulatory organs, the oxygen consumed is diminished and the uric acid increased. Charcot says that in carbonic oxide poisoning from coal gas, uric acid and urea have been observed in the proportion of 1 to 27. In chronic affections of kidney, diabetes, and polyuria, it is diminished, but in liver diseases it varies. In cirrhosis, sodium urate is largeiy excreted. In acute liver conditions, it is increased, whilst, according to Dr. George Harley, in fatal jaundice it is diminished, In dyspepsia, and in diminished cutaneous excretion, large quantities of urates are found in the urine on cooling, but this is not of necessity due always to the presence of uric acid. Dr. Bence Jones points out that there exists no relation between the acidity of the urine and the absolute quantity of uric acid which it may contain, and a copious precipitate of either is no real indication of the quantity of uric acid present. There is no necessity to discuss the mode of formation or the source from which urea is derived, be it liver, kidneys, the cartilaginous, connective, or muscular tissues of the body. It is enough that Murchison, Charcot, and many others, maintain that the liver is chiefly at fault in the excessive formation of uric acid. Dr. Fothergill shows that, although uric acid formation is due to the inadequate functional perfor-

mance of the liver, the formation of urea is imperfect, and that the condition degenerates to the earlier primitive uric acid formation of birds and reptiles. Dr. Latham[1] refers it to some fault in the gland cells of the liver, causing imperfect metamorphosis of the glycocine of the bile into urea. And he probably is not far from the mark, seeing that in the herbivora the bile practically contains no uric acid, therefore neither glycocine nor gout. It may be said that gout does not exist in the lower animals, and the so-called tophaceous deposits, commonly found in the claws of parrots and other birds, are now known to be tuberculous.[2] Dr. Burney Yeo, however, explains that the uric acid diathesis is due to imperfect nutritive changes and imperfect excretion of the results of retrograde metamorphosis, especially of albuminous substances; that is to say, *a disturbed retrograde metamorphosis*.[3] Dr. Mortimer Granville[4] suggests that uric acid is excreted chiefly by animals whose natural habits do not admit of the free use of the lungs as excretory organs. When and where, he says, there is a great need of oxygen in the system for muscular purposes, or the quantity of the oxygen obtainable by the lung is relatively small for the needs of the body, or when the lung is wholly occupied with the interchange of oxygen and carbonic acid, then uric or hippuric acid *must* be excreted. When and where there is a freer use of the lung, or in cases where the supply of oxygen readily attainable is in excess of the muscular requirements, urea is excreted, and very little uric acid passes off by the kidneys. Thus children, requiring a good deal of oxygen, always excrete hippuric acid, which is *not* invariably found in the urine of adults. Gout, how-

1 Clinical Lectures on Gout. 2 Bland Sutton. 3 British Medical Journal, Dublin Meeting, 1887. 4 Gout in its Clinical Aspects.

ever, is commonly developed at that period of life when the physical power of carrying mental purposes into effect begin to fail, and this, as a rule, is strikingly illustrated in the case of men who have habitually led energetic lives, either with muscle or brain. Sir James Paget[1] writes thus:—"Disturbance in the nervous system in some part and form may be regarded as a factor in every case of gout. There are reasons enough for thinking that changes in the nervous centre determine the locality of each gouty process, whilst changes in blood and tissues determine its method and effects, and thus is explained the symmetries of disease—gout, sometimes bilateral, sometimes antero-posterior, and thus its metastasis." The same author maintains that the liver is generally the organ which in gout fails first. It may be overworked, or its power diminished, uric acid accumulating in its substance, and is not eliminated. If a catarrh of the bronchial tubes or action of kidney ensue, the attack is staved off, but if this does not occur urates are carried into the tissues and a localised attack takes place; if there be a sudden accumulation or recent re-absorption the attack is acutely febrile. If the formation be slower, the paroxysm will be subacute. In a gouty subject anything that disturbs the normal working of the liver will produce an attack of the gout, even if the disease exist hereditarily in the kidney cells. Excitement and lesions of the nervous system are very prone to produce the paroxysm. In cases of persons whose muscular and physical power is great and who suddenly cease to exercise it, gout often ensues, or, at any rate, they get gouty deposits somewhere. Dr. Granville[2] says that the

1 *British Medical Journal*, Jan. 7th 1888.
2 Gout in its Clinical Aspects.

deforming type of gout is not the most characteristic. He shows that the presence or absence of deposits and distinctive local disturbances are determined by the organic and functional conditions of the individual rather than by any special development. Different types of organism are likely to be affected in different ways by the same disease, and obviously children get gout, and the disease is almost as common among women as among men. Moreover, in the upper extremities gouty deposits are more numerous amongst women, and it is pretty well recognised that in cases of inherited gout the female seldom escapes, whilst in equal proportion she is liable to tophaceous deposits. The commonest form, in her case, is irregular or undeveloped gout, with special manifestations, such as neuralgia of the fifth nerve; certain uterine and ovarian congestions; a form of dyspepsia with distension; false symptoms of angina pectoris, the centres of disturbance lying in the solar ganglia and its plexus. There is also in women a remarkable connection between the gouty condition and the oxalic acid diathesis giving rise to oxaluria, in which case the liver is much engaged.

Following the views of Garrod, the excretory power of kidneys is defective in excreting uric acid though not urea. Garrod thinks the kidney is the active producer of uric acid and that it is reabsorbed into the blood by the renal cells, but the kidney indirectly suffers owing to the irritation set up by defective metamorphosis and deposit of urates.

The formation of uric acid, according to Dr. Latham, is the result primarily of non-transformation of glycocin into urea and the statement in all its bearings is most interesting. To the imperfect changes in the liver and muscular tissues he attributes the uric acid formation. He draws a sharp

distinction between gout and the uric acid diathesis. The latter he considers should exist and show itself in many ways without developing gout; such as gravel and calculus. For gout there is first, a uric acid diathesis, and another diathesis besides superimposed, for the uric acid to act upon. In moderate muscular exercise the glycocin in the tissues undergoes its proper changes. Latham, however, mentions that horses, when kept in their stables excrete hippuric acid, but when at work benzoic acid only. In some kind of way work seemed to use up the glycocin. Surgically, Sir James Paget takes a similar view. He maintains that the uric acid diathesis and gout are not the same thing; many children and young people produce an excess of uric acid in the urine, lithates and calculi being most common among the poor. With the children of the wealthy classes calculus rarely occurs, yet inheritance of the uric acid diathesis may reasonably be expected.

Bence Jones considers the uric acid diathesis to be a disease of sub-oxidation, and the uric acid a less organised substance than urea. This is also Fothergill's view. Urea is not a product of uric acid metamorphosed from the tissues, but is derived from some other source. He shows also that uric acid is proportionately increased after a meal, fasting diminishing it by one half, and a vegetable diet acting in a similar manner. An animal diet increases uric acid and urea. Exercise, especially horse exercise, is the most effective preventive of uric acid diathesis, failing which, massage is the best substitute. Beer diminishes the excretion of urea and uric acid, and the action of wine is similar in its action. Tea and coffee are said to diminish the proportionate excretion of these bodies respectively,

and it is assumed that alcohol, pure and simple, and spirituous beverages generally, produce opposite results. The gout of the rich is due, in many cases, to wine — champagne, sherry, port, Burgundy, Madeira, &c.; whilst that of the poor is attributable to cider and malt liquor. Alcohol, it has been proved, in no way increases the uric acid in the blood, whilst in spirit drinking countries gout is unknown.

Garrod observes that those drinks in which fermentation has been prematurely checked are more liable to produce gout and gravel than those in which the process has been completed. Natural acid of wines does not as a rule bring about the uric acid diathesis; but some acid wines, such as claret and Rhenish wines, will in some cases, produce paroxysms of gout.

Syphilitic and lead poisonings are very peculiar in their relations to gout in the male, and their seat in the liver is pretty well recognized. Charcot has shown that when a gouty patient contracts syphilis it attacks virulently his nerve centres, producing nerve lesions and brain troubles; and between this case and that produced by lead in the system of a gouty subject there is a remarkable affinity. Granville assumes that lead forms a base with uric acid and finds its way into the blood. The characteristic blue line may or may not appear on the margin of the gums, but a number of nerve conditions such as delirium, mania, or melancholia, will inevitably appear. Then there is the great proneness in the uric acid diathesis to deposits about the kidney, to albuminuria or *Bright's Disease*, surgical conditions of bladder, cutaneous disorders, neuralgias, mucous catarrhs in their varied forms, asthma, certain eye conditions, &c. These, with few exceptions, are well treated by the Bath thermal waters.

Having thus cursorily reviewed the nature, causation, and peculiar morbid phenomena associated with gout in its regular and irregular manifestations, the treatment by the Bath mineral waters must now be considered.

Acute Gout.—Of this form in the extremities and its mode of treatment by the Berthollet vapour bath mention has already been made, and to this there is little to add, beyond urging its use wherever it can properly be applied. To the various methods of treating *chronic gout* by the Bath waters especial attention will be directed.

The treatment of gouty joints by the use of thermal waters, in conjunction with massage, heat and the various modes of its application, is of the first importance. The early trials not unusually occasion soreness as well as local discomfort, which soon subside. In cases where the patient is much enfeebled by anœmia it need hardly be said that the mildest form of treatment should be carried out; and it does often happen that, if no immediate benefit follows, the patient on returning home experiences a gradual convalescence. The invalid, suffering from inflammatory acute gout in the joints, will not bathe, douche, or drink the waters until the fit has subsided, but the natural vapour will be the proper remedy. During the intervals of the paroxysms the full treatment may, with medical sanction, be administered.

Atonic Gout.—This form of gout in its ordinary and best known form must be treated carefully. Excluding inflamed joints and such-like cases, atonic gout with all its subjective gouty feelings, is manifested by nausea, flatulence, and eructations, headache, palpitations and pains about the stomach, with more or less constipation, depression, and

erratic pains of the body. In this state of things the waters may be beneficial, but should never be used without advice.

Retrocedent Gout.—When the regular gout in the joints suddenly disappears, and is followed by some internal malady no form of water treatment can be applied. The malady gives rise to many complications, such as an affection of the stomach, heart, lungs, brain, or it may be sickness, syncope, cardiac pain, asthma, paralysis, profound apoplexy, renal calculus, ordinary nephritis, &c. When these, or either of these, supervene, the usual medical treatment must be resorted to.

Internal Use of the Bath Waters in Gout.—Sydenham's practice was to cure the stomach and then to prevent the return of the fit. There are always in weakened gouty cases, more or less dyspeptic conditions, flatus, loss of appetite, and heartburn, these symptoms predominating after acute attacks have subsided. In these cases therapeutic treatment by diet, drugs, and water cure is indispensable.

In atonic gout, there is no doubt, when it is thought expedient, that the whole gouty virus can be fixed on one point by the use of the Bath waters. Dr. William Falconer showed that the stimulus on the stomach being immediate and peculiar, restored to it such a degree of tone as to enable it to send the gout to its proper place. It is generally agreed, therefore, that the sooner the patient has recourse to bathing after the subsidence of the arthritic inflammation, the more rapidly will the limbs recover. Sometimes a stiffened or falsely anchylosed joint with chalky deposits have to be dealt with. Absorption is promoted by bathing on alternate days, douching, and using the natural vapour. The latter

method is held to be most valuable from its superior merits over water. Massage for œdema of the extremities may be pursued with great advantage.

The Bath waters, in suitable gouty cases, do not produce any heating effects, acting rather as a cordial, their influence being soon manifest by improved appetite, more regular action of the bowels, and the altered character of the urine. Useful as they are locally in diminishing the tendency of joints to form tophaceous deposits, yet when these deposits are once formed, they cannot be removed by the Bath nor by any other mineral waters. As a rule, indeed, water treatment in the severer forms of chalky joints is not perhaps to be recommended. The debilitated constitution may be weakened rather than strengthened by such treatment, especially as anæmia is more or less usually present.

Local douching and the natural vapour may occasionally be used. In arthritis-deformans Braun has pointed out that, seeing it proceeds from extreme anœmia and a certain but ill-defined cachexia, only the gentler forms of thermal treatment can be prudently applied. Sedimentary deposits of lithic acid and lithates in the urine require additional treatment. Alkaline water, containing chloride of sodium and glauber salts are, in these cases, a valuable adjunct to the thermal waters.

Gouty Dyspepsia.—The Bath mineral waters have a neutralising and depurative effect on the morbid material of gout, but (as already shown) an excess of this morbid material does *not* constitute gout; it is caused by an antecedent defect of which this excess of uric acid in the blood is only an indication. It follows, therefore, that the first departure towards gout is preceded by a derangement of the whole system, and one of the leading characteristic symptoms usually is

gouty dyspepsia. Habershon[1] observes, that, although it may not be an essential of gout, yet the state of the system induces dyspepsia of a definite form; and, although secondary changes which follow the absorption of food into the blood have more especially to do with the proximate cause of gout, still, the primary solution of food has also a relative causation.

The symptoms of gouty dyspepsia are usually well marked, and are too apt to be referred to an abnormal state of the gastric juice, which is preternaturally acid, being the cause of heartburn, which is so often experienced. Other symptoms are acid eructations, sourness of the stomach, pain at the epigastrium, furred tongue, with irritable pulse. The hepatic secretion is often disordered, indicated by a sallow countenance, with irregular action of the bowels, and very dark or clay coloured motions; there is a superabundant brick-dust-like deposit of lithates, and the urine is abnormally high in colour.[2] There is likewise usually present a large quantity of uric acid deposit, or gravel as it is sometimes called. Under the microscope the crystalline character of the deposit, of rhomboidal crystals, or clusters of acicular ones, is well known. Sometimes these symptoms are imperfectly defined, and various other phenomena may be present, simulating organic disease, but they disappear with the diminished tendency to gouty attack.

Gout in *the stomach* or in *the bowels* is a common symptom of gouty dyspepsia, the pulse being small, irregular, and intermittent, with palpita-

1 Diseases of the Stomach.

2 Woakes on Post Nasal Catarrh states that many of the symptoms of the uric acid diathesis, as those of the premonitory stage of catarrh—evince a predisposition in persons of this diathesis to be always taking cold.

tion and breathlessness after any exertion, the patient passing bad nights, being sometimes unable to lie down; and to these are occasionally superadded cardiac distress resembling angina. These alarming conditions disappear when the gouty dyspepsia is removed, or immediately after a paroxysm. The most powerful remedial agent in the treatment of gouty dyspepsia is the maintenance of a healthy state of the skin and a well-regulated diet. Habershon insists upon the spare use of nitrogenous food, and these only of the most digestible kinds, also a free vegetable diet, greens and similar products, oranges, strawberries and grapes. It is essential to promote the elimination of the excreta retained in the blood, and to this end he recommends the saline waters of Carlsbad, Vichy, Bath, and Cheltenham, as being often very serviceable.

Dr. Robson Roose,[1] among other similar places, mentions Bath as having a widespread reputation in the treatment of the gouty diathesis, and suggests that the waters taken internally, wash out the stomach, augment secretion, promote the transformation of tissue, remove waste products from the blood, and promote many of the physiological functions in the treatment of gout. "Hot water," he continues, "especially if taken slowly, is rapidly absorbed by the blood vessels, and is tolerated, without difficulty, by the stomach." He strongly recommends Bath to the weakly gouty patient.

Sir Alfred Garrod[2] observes that the waters which possess but little solid matter, and which have acquired a reputation in gouty cases, are those of Wildbad, Teplitz, Gastein, Buxton, and Bath. They are all of somewhat elevated temperature, are chiefly

1 On Gout. 2 Reynolds's System of Medicine.

used in the form of water, and are peculiarly adapted to the treatment of gout in the old and infirm. Many other writers also testify to the efficacy of the Bath waters in gout cases.

The gouty dyspeptic should drink the waters at the spring, sipping them hot and slowly twice or thrice a day, beginning with the minimum and increasing to the maximum quantity. If the liver be inactive it may be necessary to supplement the drinking with the Elizabethan crystals of Homburg, Freiderichshall, or Pullna Water, the Sprüdel crystals of Carlsbad, or some muriated mild saline. These are known to expedite tissue change.

When the varied forms of bathing and the several modes of administration are judiciously followed, chronic articular gout may be greatly relieved. It is a *sine qua non* that if a trace of inflammatory condition of joints or tissues remains, the waters must not be used, the only rational method of procedure in these cases, as well as the acute condition, being the vapour bath.[1]

When the thermal vapour is used the elementary parts of the waters are absorbed. These vapour baths relieve pain, reduce swelling of the chronically enlarged joints, lessen rigidity and contractions of the neighbouring tendons and muscles, and absorb the œdema. The Aix douche is a powerful agent, dry douches also being useful when baths cannot be borne. The same or similar means may be used daily in cases

1. The Roman Thermæ, as carried out in Rome and in Britain, are fully described in the historic portion of this work, as well as in the Appendix. In some respects many of their modes of procedure were analogous to certain parts of the system now introduced into Bath, the object, however, being rather that of luxury than health, although, no doubt, health was incidentally promoted. Besides the Roman Thermæ a full description also is given in the Appendix of the more ancient Baths of Pompeii.

of painless enlarged joints, (the result of chronic gouty deposit) when the patient can bear this stimulating treatment. After this dry massage and Faradisation accelerate the cure.

Gouty Eczema.—This is the commonest form of gouty skin eruption. It is, if dry, treated well by warm baths at 94 or 95 Fahr. If it be eczema rubrum, and if it involve the whole of the body, unless the disease be too acutely marked, the treatment should be the whole Berthollet given daily, without the shower, until dripping perspirations are produced, the results of which are highly satisfactory.

In chronic local eczema, also, the Berthollet is equally efficacious. The other forms of gouty skin affections, such as lepra, psoriasis, pityriasis, and prurigo, may, with certain advantage, be treated by papour and tempered tepid baths, according to the respective stages.

Invalids suffering from acute or subacute eczema too often come to Bath, and without advice take the baths, with very prejudicial results. The error is without excuse and almost unpardonable. The *hot* water in these circumstances is too stimulating and in its action too irritating. The vapour is palliative and soothing in its effect, relieving the intolerable itching, and, being absorbed into the blood, is in fact a powerful therapeutic agent.

Irregular Manifestations of Gout.—In this form of gout, such symptoms as gastralgia, neuralgia, and other anomalous conditions, the Bath waters are found to be highly beneficial. They should be drunk at the spring at from 110 to 115 Fahr. Incipient symptoms of visceral gout occur in the uric acid diathesis before joint symptoms appear. Gouty disorders of the digestive organs are common precursors

of articular gout and frequently occur alone. The throat, symptoms of false angina, pharyngitis, with the acidity, flatulence, constipation, hœmorrhoids, (shewing gastric and hepatic dyspepsia of stomach and duodenum), violent colic, gastralgia, vomiting and prostration; these may all be judiciously treated by the waters being taken internally, or by external application, pulverised and atomised in the form of warm spray in the inhaling rooms.

The gastro-interstinal form of suppressed gout, such as diarrhœa and colic, are likely to be benefited by the hot topical application of the waters, gentle massage, and Faradisation. When the affection is accompanied by conditions of chronic gastritis from like causes, then the local distress is greatly relieved by the process of *washing out the stomach* with the mineral water, by means of the ordinary glass funnel and elastic tubing.

Sir James Paget shows that gouty phlebitis, another irregular manifestation, is often hereditary, especially in persons of advancing years. And it is only necessary to mention asthma and bronchitis as connected with the diathesis, to be followed in its remission with articular gout. the sputa of the gouty bronchitic in these cases containing uric acid. Dr. Headlam Greenhow, a quarter of a century ago, was one of the first to press on the profession this connection of bronchial catarrh with gout, and he habitually sent such cases to Bath for the thermal treatment. Then the nerve phenomena, called nervous gout—inherited most frequently—such as migraine, the various neuralgic affections of the head and face, arising from the fifth nerve, neuralgia, headache, sleeplessness, vertigo, swimming of the head, noises in the ears, blind megrim, sciatica, gouty iritis, and hot eyes, are all indications

of acquired or inherited gout (ill developed and irregularly manifested), all of which respectively are especially amenable to the effects and treatment of the Bath waters. The swimming baths are most beneficial for neuralgia, as well as certain kinds of dyspepsia and migraine in females.

The view suggested by Heberden[1] a hundred years ago, of the action of the Bath mineral waters in gout is now exploded. Some gout specialists, for years, accepted his theory. If the thermal waters of Bath are of the least therapeutic value in gout they are especially so in the irregular manifestations of the disease. It is an obvious truism to say that in proportion to the improved appliances, and the enlarged facilities for the utilization of the thermal waters, so in proportion is their value enhanced in a therapeutic sense. It is not a vain boast, but a manifest fact, therefore, that in all its essential principles, details, and methods, the bathing system in Bath is equal, and in some respects superior to that of Aix-les-Bains, Wildbad, Gastein, Teplitz, or that of any other in Europe. Every known treatment has been introduced through the enterprise of the Corporation, and when this, in combination with the temperature, the never failing supply, and the hygienic properties of the waters are taken into consideration, it will be admitted that nothing has been left undone that science, art, and philanthropy could achieve in making Bath one of the first health resorts in the world. The great importance of the Bath waters, as now used in cases of irregular manifestations of gout, is in lengthening the intervals between the

1 Heberden made the remark that he had not been able to see any good results from the external use of the Bath waters, either where gout was present or in the intervals: on the contrary, he thought they appeared rather to increase the weakness of the limbs.

acute attacks. The acute attack is but an exacerbation of a chronic ailment always more or less present in the system. Experience shows that patients who need the Bath waters do better by taking a course twice a year at regular intervals, such course being determined by the nature of the case, the weakness of limbs after gout, for example, being a leading condition. As a general rule this class of patients will find the tempered douches with scientific massage the proper course to take. The water, *qua* water, is not absorbed, the natural vapour on the contrary undoubtedly passes into the system. Invalids, therefore, who can use the *Berthollet*, recover in a shorter time than when treated in the usual course. A large proportion of the debilitated gouty invalids cannot at first bear the vapour bath; and as a rule, have recourse to it only during a second course. For reasons already given, the purgative saline waters containing common salt are useful adjuncts; and they are also useful in accelerating the osmotic circulation of the bowels. If it be desirable to increase the alkaline, antacid, and diuretic properties of the Bath waters, the Vichy Célestins may be employed; and in corpulence, plethora, and giddiness, the muriated saline waters are also extremely valuable.

For weakly persons, who suffer from obstinacy of the bowels, and who cannot take much exercise, the natural salt of the Homburg Elizabethan Spring is a useful combination with the Bath waters during a course; and it is needless almost to say that careful discrimination of diet is of the utmost importance. Dr. Pavy,[1] concurring with Dr. Habershon in opinion, points out that in cases of persons taking much muscular exercise, a diet of animal

1 On Food.

food, rich in quality, is necessary to promote health and bodily vigour; whilst persons of sedentary habits, and with a disposition to gout, should avoid such diet, and the more severe the state of inactivity, the greater the preponderance should be of vegetable food.

Nothing tends so much to the recurrence of gout (whether regular or irregular in character) as nervous exhaustion, whether produced by undue excitement or by physical fatigue. Late hours, with broken or sleepless nights, aggravate all such symptoms. The presence of uric acid in the blood induces resistance of the arterio-capillary circulation, with high arterial tension, succeeded by its various forms of degenerative mischief. In this condition nourishing food and careful diet in all respects are of the first importance. No one understood this better than Sydenham, of whom and of whose system mention has already been made. He laid it down as an axiom, that derangement of the digestive organs was the primary cause of gout, and that the cure consequently must be through the stomach. Cullen was of opinion that persons of active habits engaged in healthy employment, as well as vegetarians, are less liable to gout in any form than any other class of persons, and there is no reason to doubt the doctrine.

Disorders of the Digestive Organs—not Gouty.—Among the prominent disorders for which the Bath waters are beneficial, may be mentioned impaired digestive organs. Sufferers in this way too often neglect the mineral water treatment until their complaints have assumed a chronic form; these are manifested in a pale yellow or bilious complexion, a furred dirty tongue, foul taste in the mouth, diminished, or an almost entire loss of appetite,

accompanied by weight and oppression : to these may be added constipation, diarrhœa, with cold hands and feet, depression, a sluggish will, and an indisposition to enter upon occupation of any kind. These are cases for the Bath waters which invariably produce very beneficial effects, and where constipation is present the occasional use of the lavement is desirable. The late Dr. William Falconer, in relation to the subject, said: "That every medical practitioner of this place had seen instances of people labouring under want of appetite, pain and spasm of the stomach and bowels, together with all the other symptoms of depraved digestion and want of power in the proper organs to perform their functions, joined to a very great degree of weakness both of the body and of the spirits, relieved by the use of the Bath waters. The recovery in such cases is particularly remarkable from its taking place so quickly after the commencement of the trial of the remedy. A few days will frequently work a change in the situation of the patient, as would be scarcely credible, were it of less common occurrence." The appetite is restored, the wandering spasms and pains cease, the natural rest returns, and the spirits are raised to their proper pitch. The strength likewise improves daily, the natural secretions and the regularity of the body, in point of evacuations, being restored.

The late Dr. Brinton[1] speaking of dyspepsia, says:—"Mineral waters as therapeutic agents can hardly be valued too highly. It is certain that many of them are sustained without inconvenience by stomachs far too irritable to support the artificial mixtures prepared by the druggist in accordance with our prescriptions, and equally certain that

1 Diseases of the Stomach.

they introduce into the system considerable quantities of the very remedies (chalybeates, salines and aperients) which we are compelled to resort to as remedies in many varieties of dyspepsia." Professor Charteris[1] also says:—"When the pharmacopœia fails, he can supplement by other means—for the resources of the medical man are not exhausted. From great depths, in some cases dependent on volcanic forces, there springs up in favoured places earth's remedy for some human ailment. Pure and sparking with surcharged gas, this pleasant beverage can be retained by the stomach without heaviness or nausea. The salts contained are thus easily assimilated by the system, and the glow of health in time mantles on the countenance of the invalid. Many of these places were at one time scoffed at by those who had never seen them, but a better appreciation of their worth has dismissed pretty effectually this feeling."

Diseases of the Skin.—Of these the chief are lepra, psoriasis, eczema, acne, prurigo, lichen, icthyosis, pemphigus, boils, nettle rash, sclerosis of skin, and many other chronic cutaneous diseases, are proper disorders to be treated by the mineral waters. Hebra's method of keeping patients with chronic psoriasis and lepra for prolonged periods in tepid baths may be followed in the baths of Bath, as well as in those of Luek, in Switzerland. Should the case happen to be rheumatic or gouty in its origin, it is completely cured, but when the strumous forms of psoriasis have to be dealt with, the results are less favourable. From the mild mineralisation of the waters their efficacy is limited; but the *Berthollet* natural vapour bath is a powerful therapeutic means of treating many obstinate chronic scaly skin erup-

1 Journal of Hydro-therapeutics.

tions. A general rule to follow is to begin with reclining tepid baths, with gradually increasing temperature, and prolongation of immersion in deep baths. The older bath physicians, such as Drs. Peirce, Charlton, W. Falconer, Sir G. Gibbes, and Oliver, have all extolled the value of the Bath waters for the scaly type of cutaneous diseases. It seems probable that many patients who may have taken a summer course at Aix la Chapelle, Aix les Bains, Schinznach, or the mud baths of Marienbad or Franzensbad in Bohemia, would find in Bath a desirable winter resort.

Anæmia, Chlorosis, and Malarial Cachexia.—It has been already shown how patients suffering from anœmia—especially the form resulting from tropical climates—often bear well the natural mineral bath. Malarial cachexia patients are rapidly benefited by the *Berthollet;* whether this result arises from the minute elements of the iron and arsenic—contained in the vapour—being absorbed by the skin, may perhaps, be open to question. Be that as it may, the skin is pervious to gases and volatile substances dissolved in water, as for instance, free iodine and sulphuretted hydrogen, which are taken up in the bath; while the carbonic acid which occurs in mineral waters is capable only of being absorbed in baths rich in carbonic acid, and then only it may be in minute quantities, on account probably of the gas tension of the blood and lymph streams. If the *Berthollet* cannot be borne by anœmic females, the tepid reclining bath, with gentle wet massage, over the region of the liver and spleen answers well. After a summer course of iron waters for anœmia and chlorosis at Spa, Schwalbach, and St. Moritz, a winter course at Bath is often found desirable, the mild reclining tepid baths being recommended for the weakly, with dry massage at

home. Judicious drinking in small quantities of the waters, hot from the spring, reveals the effects by increased colour of cheeks—diminished ennui and a general improved appearance. In these cases it is commonly found that the protosalt of iron in the waters is assimilated and easy digested. This ingredient in some waters is much stronger than that found in the Bath waters, and instead of relieving, tends to increase the dyspepsia, and does not assimilate with the blood.

Dr. William Falconer, in speaking of chlorosis, referring to that which is attended with paleness, diminution of strength, and depraved appetite, says the Bath waters are very generally successful, and may be used in all cases where chalybeate medicines are proper, and this view is supported by Dr. Saunders and others. It may now be added for the chlorotic anœmic patient that the reclining bath and massage administered locally are most valuable. Dr. Charlton, a contemporary of Dr. William Falconer, recommended three months' steady treatment, with an interval of two or three weeks, then resuming it for a month, the results being slow, but in the end sure. The treatment of chlorotic anœmics at Ems by the Neue Eisenquelle spring, for drinking, and the Römerquelle, or Romans' spring, in the private hotel or bath house, *Prinz von Wales*, for bathing, whether preceding or following the Bath winter system, is singularly efficacious.

Interrupted and painful Menstruation.—This affection is characterised by a cadaverous complexion, depraved appetite and digestion, languid circulation, puffiness of the lower extremities, mental languor, pains in the head, back, and loins, with dyspeptic symptoms, costiveness, and often more or less sacral neuralgic pains. Therefore, in the treat-

ment of this form of perverted function the cause should, if possible, be defined. For instance, if it does not proceed from general anœmia but from local atony of the uterus and ovaries, the *cold* hip bath would be desirable; if from anæmia the hot bath douche, or douche ascendante. The Bath waters have by long experience proved in such cases to be a most effectual remedy. The reclining bath, in conjunction with the local application of the hot under current over the sacrum, ovarian, and lumbar regions, are also recommended. The lavement or douche ascendante will, as an adjunct, materially aid the treatment. The sitz bath, similar to that used at Marliox, is peculiarly well adapted to the relief of this form of functional derangement.

The late Dr. Wilbraham Falconer, from long and close experience, was able to testify to the beneficial effects produced in this affection by warm bathing in conjunction with the lavement or wet under current douche. This may in certain cases be followed by massage or some form of shampooing. Young girls, as a rule, will find the swimming baths at 84 Fahr. both comforting and invigorating.

Leucorrhœa.—When this affection does not arise from organic disease of the uterus it is treated with marked benefit by the wearing of a wire or gutta percha perforated speculum during the bathing, rather than by internal injections. Cervical erosions and uterine catarrhs should be treated in the same manner. This is the best and simplest mode of applying the waters internally, and may frequently be used. A course at Ems, Schwalbach, or Franzensbad should follow in the summer.

Sterility.—When sterility is independent of malformation the waters are held in high esteem. The

earlier writers, especially Peirce and Guidott, were impressed with their efficacy,[1] and in cases of perverted secretion in pregnancy, their importance cannot be too highly rated; and it appears that the douche ascendante has been long used. When the constitution needs bracing, or iron, a course at St. Moritz, or at Ems, the most popular ladies' bath in Europe, is the treatment suggested. True, no known waters are believed to obviate sterility, yet the local conditions may be improved by the Bubenquelle for local douches at 95 Fahr., followed by drinking the Neue Eisenquelle, and bathing in the Romerquelle. Some uterine cases are also well treated at Schlangenbad. It may be added, that, in cases of sterility caused by certain functional derangement, the carbonic acid baths of Franzensbad are most likely to be efficacious.

Chronic Inflammation of the Ovaries.—These cases are well treated by the reclining baths, with the hot under current at 100 Fahr., with Faradisation and gentle massage locally applied. Uterine constrictions will be best treated by the vapour bath.

Hysteria.—The douche ecossaise and the douche en cercle should in such cases be applied, with or without the Aix massage douche. Dry massage and Faradisation are generally needed. In spinal paralysis the Scottish douche, with alternate jets of hot and cold water to the spine, are recommended. In cases of obstinate hysteria the *Weir Mitchell* treatment is indispensable. The treatment is described elsewhere, and it may be well to state that in these cases it must be carried out thoroughly.

1 Mary of Modena, consort of James II., visited Bath, and was a patient of Peirce's, in whose house she resided, and derived effectual benefit from her visit. The story is full of romance and interest.—See Mr. Peach's Historic Houses, First Series, page 5.

Diseases of the Nervous System.—Palsy.—The common form which has to be dealt with chiefly, is rheumatic palsy, or that condition commonly found after rheumatic fever or sharp attacks of subacute rheumatism. The treatment at first should be the warm reclining bath combined with the under current and wet massage, and when the patient increases in strength the Aix douche may follow; and, when it is deemed prudent, the steam *Berthollet* with dry massage is proper. The *Bouillon* will be found very beneficial when prostration is not a prominent condition, Faradisation being also appropriate. The muscular atrophy (not that which proceeds from arthritis) which arises from gout and rheumatism is well treated by the Bath waters.

The following may be regarded as an approximate list of nervous cases proper to be treated by the waters in their various modes of application:—Paralysis of diphtheria, ague, and typhoid fever, from cold and exposure, whether involving a limb or a portion of a limb, or a special nerve or set of nerves, such as facial or Bell's paralysis, or those of the eyelids only; hysterical paralysis; palsy arising from lead, mercury, copper, and arsenic; chorea, in the subacute or chronic stage; and infantile spinal paralysis. For the local paralysis of blood poisoning and infectious fevers, the dry douche at 100 or] 102 Fahr.—the Aix massage douche, and Faradisation applied to the nerve centres with returning strength—the continuous as well as the interrupted current—are all thought advisable, the cold douche only being used in the paralysis of hysteria. In the paralysis of lead poisoning the late Dr. Wilbraham Falconer quoted many successful statistics, based upon observations in the treatment of patients in the Bath Mineral Water Hospital. He held that

the mineral poison deposited itself in the substance of the liver, and therefore it was necessary to increase the bile flow, which was easily produced by small but frequent doses of the Bath thermal waters, *i.e*, every four or five hours in the day. The effect was, that after each dose bilious evacuations followed. In the lead and mercurial cases in particular, the waters being taken largely in the aggregate, the presence of the sulphates, combined with the lead to form gypsum, thus rendering the lead innocuous and easily eliminated. In these cases the bath may be given with advantage as they always have been; but now a far more effectual treatment will be found in the *Berthollet* natural vapour bath. The robust order of persons can likewise take a bath daily, in conjunction with the Maillot, the results being most beneficial; the blue line along the gums becoming fainter, the tremors less marked, with general abatement of symptoms. When necessary the dry massage applied to a limb, with Faradisation, is no small aid. In many cases the patients should remain for a period of three months. The testimony of Peirce and Guidott, as well as that of later writers, to the efficacy of the waters in cases of metallic poisonings is beyond dispute; especially as it is so abundantly confirmed by the records of the Bath Mineral Water Hospital, which show the number of cures of dropped hands, the palsy seen in painters, plumbers, gilders, compositors, etc. The old traditional treatment, valuable as it was, is now greatly aided by the auxiliary *Berthollet* vapour, which effectually induces absorption and assimilation of the chemical constitutents of the waters. The great *desiderata* in all such cases manifestly is stimulation of certain organs. It is therefore necessary to produce free action of the kidneys, a dripping skin, and removal of constipa-

tion, and then recovery is more than hopeful. Lead poisoning, though of a less serious character, is produced by persons drinking cider and home-made wines, etc., made in pans and other utensils glazed with lead. Formerly these cases were more numerous than they are at present, but they were always successfully treated by the waters, but now the recovery is greatly accelerated by the vapour treatment by which the poison is sooner eliminated. Palsy, with paralysis of the extensor muscles of the hands, may, with great care, under similar treatment, be perfectly cured.

Hemiplegia from Apoplexy.—This is a grave disorder, although the French water physicians regard it as of a character, in many cases, yielding to their treatment. Of course during the acute inflammatory stage, water treatment is not to be thought of; when that should begin, depends upon the congestive phenomena and their results. When the proper time arrives, there is a consensus of opinion among the medical staff at Aix, for example, that with prudence the employment of baths and douches is highly beneficial. It seems, however, that the amount and condition of the blood clot, and the consequent extent of the brain lesion will determine very much the nature of the treatment to be adopted, and the prognosis of the case. For these cases the reclining bath, mildly tempered, and the douche with gentle pressure, are good. It may be added that all stimulation and excitement should be avoided. Resolution and re-absorption of the blood clot may, and as a matter of fact, does occur, and the fact is borne out by the recovery, partially or absolutely, of the limbs.

Syphilitic Gummata. — Guidott and other early physicians alleged that in these cases, absorption

occurred from immersion, but be this as it may, the effect is immeasurably augmented by the *Berthollet* vapour, when its application can be borne.

Spinal Paralysis.—In these attacks it is indispensable to know from the specialist or the family physician, the causation of the attack; it may be acute myelitis, or spinal softening; it may be acute spinal meningitis, or tumour, and these are not proper cases for water treatment. In chronic myelitis, when the inflammatory conditions have subsided, vapour douches and spray in their mildest form are singularly agreeable and beneficial. In chronic as well as in syphilitic paralysis, the waters are good, and the modes of their application are the same in both cases. In certain cases, when a patient is taking a reclining bath, interrupted and continuous galvanism and wet massage are used as important auxiliaries. Dry massage also can be very successfully pursued.

Locomotor Ataxy.—Charcot recommends tepid bathing, the reclining bath, and the *Berthollet* at 90 or 92 Fahr., with the gentle spinal spray. Sometimes the girdle pains and the lightning flashes down the legs undergo some apparently favourable changes in their character; but at best these are untoward cases for the use of any kind of mineral water. If the later vapour treatment cannot with certainty be recommended, at any rate it should be tried.

Chorea.—The late Dr. Wilbraham Falconer made a special study of these cases for many years before his death, chiefly during the time the writer held the post of Resident Medical Officer at the Royal United Hospital. The treatment consisted of absolute rest and repose during the severity of the acute stage, and

in cases where an abatement of the symptoms followed then the tempered reclining baths, with the warm under current to the spine was cautiously administered, together with shampooing. It was found that the appetite became restored and food was taken with avidity, natural sleep and general improvement rapidly following. The most satisfactory cases, however, were those associated with a rheumatic history, the elimination of the rheumatic poison being followed by rapid improvement and restoration to health. The heart condition when defective recovered in many cases its normal tone. Most of the patients drank the waters; the reclining bath with the under current up to 104 Fahr., being generally used, and in most instances dry douching and shampooing. Practical experience has shown that in recent cases of chorea associated with the rheumatic diathesis, the Aix douche tempered down, with the discriminative use of massage, have produced satisfactory results, and the internal use of the waters drunk twice or thrice a day, are recommended. As regards the general results of the vapour system, so far as they can be measured by short experience, they have been most successful, and afford the most favourable guarantee for its extended use and importance in the future as a therapeutic auxiliary to the waters. In cases of rheumatic chorea, without advanced cardiac complications, the vapour treatment may be regarded as a safe and remedial agent.

In cases of syphilitic, gonorrhœal or urethral rheumatism, with specific cutaneous eruptions (especially if the invalid has been previously saturated with mercury), the internal use of the waters and bathing are generally followed by beneficial results; and the anœmia (with more or less cachexia which

usually arises in this specific type of disease) sooner or later also yields to the waters. The debility of the skin is usually dealt with by the *Berthollet* vapour and the shower bath, tempered to the requirements of the individual. It is in contemplation to add a sulphur water to the treatment of the syphilidœ, and the project may probably be carried out when the massage baths are completed. In treatment, Aix la Chapelle, Aix les Bains, Buyères de Nava, and the Pyrenéan Spas, claim a monopoly in respect of sulphur water, yet Braun contends that sulphur baths are not a specific remedy for the cure of syphilis and the manifestations of latent dyscrasia, and this is borne out by Hebra. The earlier physicians in Bath used the waters largely for syphilis and its sequelæ, and probably they were right, on the assumption that simple thermal baths exercise the same effect as the sulphur baths. The syphilitic patient is bound to be treated for his cachexia as well as for the original poison. The skin discolorations of syphilis are beneficially treated by the *Berthollet*, with occasional swimming, and reclining thermal baths. An Aix douche, now and then, may be used to remove the accumulated layer of cuticle, and to promote more rapid tissue change, the atonic state of the skin during the taking of mercury rendering the patient susceptible of frequent chills.

The so-called Urethal or Gonorrhœal Rheumatism.—The Bath waters in these cases, are very efficacious, and beneficial results follow the various thermal applications. The true nature of the disease is but little known. Is it due to the gouty or rheumatic diathesis, or to septicœmic absorption? Women are rarely if ever affected. The disease is free from cardiac complications, the joint pains being usually fixed. Constitutional disturbance is generally

transient, and is seldom acute. All these symptoms are the contra-indications of acute rheumatism. The young men who present themselves for treatment are generally of a pale lymphatic type; anœmia usually being very marked. The adoption of the whole mild course is the correct treatment—reclining baths, deep baths, swimming baths, the *Bouillon*, an occasional Aix douche, and dry douche, the under current (and when it can be borne), the vapour followed by dry massage, or massage in a reclining bath. The patient will assuredly experience relief and permanent benefit. Usually, with the foregoing, are combined copious doses of the water, to which, if necessary. iron may be added, whilst a generous diet, without stimulants, is of the first importance.

Women after ordinary accouchements and in complicated lying-in-cases, such as white leg and pelvic exudations, formerly resorted to the use of the Bath Waters as a regular mode of treatment. In the convalescence of labour, a short course of the waters is found to restore strength. For reasons, not yet explained, the habit has been of late years relinquished; this is to be regretted, inasmuch as it was followed by the happiest results. Charlton mentions the value of the waters in the palsy (hemiplegia of women) arising from delivery.

The debility, arising from protracted illnesses, such as diphtheria, typhoid, and other fevers, are much benefited by the Bath waters, aided by the sheltered locality and warm westerly breezes. Those suffering from functional disorders proceeding from cerebro-spinal exhaustion, mental tension and anxiety and excessive wear and tear, will find in Bath many sources of relief, climatic, social, and physical, besides the thermal waters, which may in vain be sought in many other places called "health resorts."

Diseases of the Respiratory Tract.—Chronic bronchitis and asthma, bronchorrhœa, chronic laryngitis, pharyngitis (rheumatic and otherwise), and general catarrhs of the mucous tracts, are treated by the inhalation and pulverization processes in combination with the thermal spray, thermal vapour, and sulphur water spray, as at Marlioz and Aix. In certain cases those means are aided by Siegle's steam spray, atomising the various fluids ordered.

The *Humage*, such as used at Aix les Bains, is merely the thermal vapour inhaled through a tube straight from the drum, so that the vapour ascends from the head of the spring pure and undiluted. In one of the rooms it is proposed to set up an *Umbrella* spray, by which the room is filled with the thermal vapour, at a temperature of 75 to 80 Fahr. The atmosphere is saturated with warm vapour, the inhalation of which, contains the solid chemical constituents of the Bath waters in a state of fine pulverization, and is a process by which great good is effected. Cases of chronic bronchial catarrh, catarrhs of the eyes, mouth, throat, and nose, may be appropriately treated at all seasons, but especially in winter.

In cases of Dyspnœa, especially with expectoration in the gouty and rheumatic, thermal steam inhalations, such as are recommended by Sir Morell Mackenzie in some inflammatory conditions of throat, are fraught with beneficial results. It is anticipated that the Lippspringe system will be adopted. This means the inhalation of the nitrogen, oxygen, and carbonic gases for certain lung affections. The Bath waters are highly charged with nitrogen gas, and although some scepticism exists as to its utility in phthisical cases, its hygienic properties and effects have been abundantly proved

by long experience at Lippspringe. The chemical gases in the Bath waters resemble those of Lippspringe, and now their action will probably be put to the test, and found to be in all cases identical.

It must be admitted that these inhalations produce increased expansion of the lungs, and it is thought by Braun that the highly charged moist nitrogenous air will produce effects analogous to those induced by the climatic influence of high elevations.

CHAPTER XV.

"How poor are they that have not patience!
What wound did ever heal but by degrees?"
Shakspere.

SURGICAL DISEASES BENEFICIALLY TREATED BY THE BATH THERMAL WATERS.

Gunshot Wounds.—We have tangible proof that the Romans used the "Thermæ" for the treatment of wounds, fractures, contusions, etc., among their soldiery, and from time to time, after great wars, mineral waters have been freely used in the treatment of all kinds of surgical injuries.

After the Franco-Prussian War, the French Government sent their wounded soldiers to Aix-les-Bains; and the Germans to Wildbad, Gastein, and Kissingen. Dr. Brachet, of Aix, has published a series of satisfactory results, showing the sovereign value of the Aix waters in military surgery. Similar satisfactory results have been recorded by the German surgeons whose wounded were sent to their Indifferent Thermal Spas. The chief treatment at Aix consisted in the application of the local *Berthollet* to the limbs damaged by fracture, accompanied by more or less cellulitis or obstinate œdema

of the extremities, followed by the use of the dry douche, modified in force and temperature, and ending with the judicious use of massage to the indurated structures.

Cases of old Dislocation. —When these injuries arise for example in the hunting field, and where there remains hypertrophy of the fibrous and cellular tissues, with more or less stiffness about the joints after reduction, the best kind of treatment is found in applying the hot mineral water in the form of spray, with circular friction and continuous massage, the different processes being carried out for some weeks, until the mobility of the limbs has been re-established. In some cases an anæsthetic is necessary to break down adhesions. Many an awkward case of anchylosis is due to the limb having been kept too long in splints, or supported for too long a time against the side of the body. As a last resource the Bath treatment is tried, but these cases frequently end in permanent and incurable rigidity.

Caries and Necrosis of Bone with Sequestra, Fistulæ and Sinuses. — These affections are beneficially treated by continuous soaking of the diseased parts in the mineral waters for considerable periods of time. The tissues are cleansed, saturated, and a general healthy action is usually set up. The waters act as an antiseptic on the blood and tissues, insuring at any rate perfect cleanliness. The revival of this mode of treatment has afforded encouraging results. In scrofulous cases the great object in treatment is to preserve the invalid as far as possible from the long continuous progress of the local disease, and gradually to improve the nutrition of the affected parts, by promoting tissue change. If fever be present cooler baths must be used—the cooler bath being the more tonic, the warmer the more absorbent.

Some centuries ago a Horse Bath, which received the waste waters from our baths, stood near Dorchester Street. A similar bath now exists at Schlangenbad for veterinary purposes, and the French Government now use some of their Pyrenean Spas for the treatment of horses at their various "Haras."

Traumatic Exudations, as seen in that form of hard, brawny cellulitis, in excessive formations of callus after fractures, in sprains, contusions, and luxations, in false anchylosis after fractures, stiffness of tendons after injury, or tenotomy, and muscular contraction from too prolonged a rest. All of these require active and strong absorbent treatment. Occasionally, for some individual conditions, the cold water system is required, alternated with the thermal, but usually the thermal absorbent system is borne by far the best. For the legs and arms the local thermal vapour, with local douchings, frictions, and well defined massage, is necessary. With an altered nutritive change of the structures, such as a fatty condition of the muscles, electricity, either Voltaic or Faradaic is required to bring about the best results. It is often found that some of the most troublesome cases of hyperplasia of the tissues of the lower limb, which are caused by a too careful and prolonged use of the plaster of Paris or starch bandage in the treatment of fractures or contusions, are successfully treated by vapour and massage.

Ovarian and Fibroid Tumours of the Uterus.—Attempts have been made on the continent, at Kreuznach and Carlsbad notably, to treat these kind of cases with hot baths— the object being to promote absorption by virtue of the Söol and Iodine properties respectively. How far these results have justified

this mode of treatment Dr. Engelmann, of Kreuznach, speaks confidently. He says that the bromo-iodine waters of Kreuznach have an appreciable effect in diminishing the size of uterine fibroids. This authority has encouraged the use of the Muterlauge of Kreuznach in measured litres in connection with the Bath system. A very remarkable bath is prepared, the free iodine being quite appreciable. More definite results of this form of treatment will follow an extended experience.

Strumous Disease of the Hip Joint.—In the early stage of hip joint disease, the thermal waters have afforded great benefit. A Thomas's Hip Splint is usually worn night and day; and a high heeled boot on the sound leg, with long crutches enable the patient to get about. Therefore, instead of the old method of absolute rest in bed, these cases do well with local douching, gentle massage, generous feeding, abundance of fresh air and sunshine, and gentle exercise. Numbers of such cases are being constantly treated in this way, and the soothing effects of the thermal waters are not the less important factor in accelerating recovery.

Strumous Disease of the Knee Joint.—In the early stage, the same mode of treatment as in the previous case is adopted, a Thomas's Knee Splint, or a Calliper, being used to fix the knee joint, and to keep it rigid night and day. The soothing action of the thermal waters is equally grateful in these cases, the patient being allowed out of doors and the same conditions observed as in hip cases. Massage and circular friction also may be used when the acute inflammatory condition has subsided.

Morbus Coxæ Senilis.—This is the partial progressive rheumatic arthritis of Charcot. The

thermal mineral water treatment cannot cure the disease, it can only palliate and relieve the stiffness and irritability of the gluteal, obturator, and adductor muscles, when aided by dry massage and the Aix massage douche. And it is only fair to say that these kind of cases are in no way arrested in their morbid development by any therapeutical action of the Bath mineral waters.

Chronic Synovitis.—Whether this be of gouty, rheumatic, or strumous origin, the thermal Bath waters have, from a very remote period, been highly esteemed. Mr. E. M. Little[1] has pointed out that in strumous disease or white swelling of the knee joint, the most marked and permanent improvement follows their use in winter and spring. In the earlier stages of chronic synovitis in strumous subjects, there is locally little the matter beyond hyperæmia of the synovial membrane, with effusion. Change of air, use of the mineral waters internally, combined with steady perseverance of local treatment, often checks the disease, and sometimes results in permanent cure. In more advanced cases where the synovial membrane is considerably thickened and mobility limited, in many cases, great improvement follows. After all, pain and local heat have ceased, gentle and persevering massage is recommended. It is found, however, that the use of the local steam *Berthollet* in the sub-acute and chronic condition is more valuable than any other mode of treatment. After awhile, when the dry douche can be borne in reduced strength, and steady massage can be administered, very happy results are recorded. Firm pressure with elastic webbing after bathing and steaming to expedite absorption, must be observed.

1 Journal of Hydro-therapeutics.

Specific Synovitis of Syphilis.—This form is usually more obstinate under treatment, but it is fairly admissible on the same lines. The alkaline-iodides having an acknowledged therapeutic value, are materially strengthened when used with the Bath waters.

Wry Neck.—In cases where the acute stage has subsided, the local *Berthollet* vapour, careful massage, Aix douche, and sometimes the swimming bath bring about satisfactory results. In cases of an acutely spasmodic character a mechanical support should be worn, and reclining baths with the hot-under-current of 104 Fahr., alternating with the local vapour at 116 Fahr., should be followed.

General Weakness of the limbs after Injury. — The local vapour, Aix douche, daily massage, continuous and interrupted electricity, and occasionally the dry douche judiciously tempered, produce good results, and when local œdema of the limbs is present from a languid venous flow, the steam treatment, with massage and elastic pressure, answers well. Sometimes the Scottish douche is added to complete the cure.

Splenic Tumours.—When arising from malarial causes, the Bath thermal waters are prescribed with good results. In certain cases the *Berthollet* should be used during the same course as when the local massage is applied to the seat of the swelling. Invalids arrive constantly in Bath from the tropics, with the characteristic anœmia, wasting of the body, and general cachexia, the result of exposure to malarial conditions, and these cases are treated with eminent success by the natural vapour. This again seems to be confirmatory of the fact, already stated, as to the effects of this process producing absorption into the circulation of the minute chemical elements of

the water, namely arsenic, iron, etc. Beyond all controversy no such rapid recoveries follow ordinary treatment by immersion.

Diseases of the Throat and Nasal Passages.—These are dealt with by the various apparati in the inhaling and pulverising rooms. The cold sulphur spray as at Marlioz, the bromo-iodine water of the Woodhall Spa, as well as the Thermal Spray of the Bath waters, are all used according to the bath-doctor's prescription.

Hepatic and Renal Calculi.—The early Bath physicians, Peirce, Guidott, and William Falconer, urged the use of the Bath Mineral Waters for these kind of cases. The hot bath, at 104 Fahr., with a large consumption of water internally was recommended, with the view of aiding the excretion of urea and dissolving the stone, and favourable results were reported. Those results we are bound to respect, although it is difficult to understand how calculi are dissolved. Yet it is not a little singular, as pointed out by Dr. Burney Yeo, that the lime-sulphated waters of Contrexéville produce precisely the same therapeutical effects as those described by the early Bath physicians. How far, says Dr. Yeo,[1] these effects are due to undigested water, or to the passage of large quantities of water (taken fasting), through the hepatic portal circulation, stimulating an abundant flow of thin fluid bile which acts like a purge when it reaches the intestine, is a problem, or, he asks, does it arise from the purgative effect due to both events? Dr. Burney Yeo also suggests that the Bath mineral waters should be taken *cold* in like manner for calculous diseases. It has also been observed how little mention has been made of the action of lime

1 *British Medical Journal*, Dublin Meeting, Jan. 14, 1888.

and magnesia on renal calculi. Yet again the wonderful results of the Contrexéville water leads to the belief that lime and magnesia salts have some inherent power in themselves to dissolve calculi, a potentiality which has not yet been scientifically recognized. Further, the value of the grateful *Sulis Water* in this type of disease must not be overlooked or underrated.

Catarrh of the Bladder.—After the subsidence of the acute stage, the daily washing out of the bladder with the Bath mineral water at 110 Fahr., by funnel and tube, or still better, with an "American Surgical Pump," when the urine is alkaline and muco-puralent, and showing decomposition, answers as well as any other local antiseptic known, and, moreover, is not irritating. It soothes the irritable, inflamed mucous surfaces, and if the bladder should happen at the time to be an absorbent organ, the absorption is innocuous. This form of bladder washing with the mineral water frees the organ of *débris* after stone crushing, and equally well after lithotomy in young children. In the hypertrophy of prostate gland usually met with in people of mature years, the local washing out done, *secundem artem*, is followed by inexpressible comfort. The waters are recommended in these cases to be drunk pretty freely.

Gout in its Surgical relations to the Human Economy.—Sir James Paget, in his clinical lectures and essays, points out that gout is of special interest to the surgeon. *First*, that it mingles with a variety of diseases and with various effects of injuries modifying their several processes; and next, that it appears in a large number of cases in minor diseases, and disorders of various parts in cases which are either referred to as incomplete, anomalous, or suppressed

gout, or more commonly, are obscurely thought of as local and casual inflammations, and in explanation of this frequent appearance of the lesser forms of gout in surgical practice we must look, he thinks, to its transmission by inheritance.

Injuries even of a comparatively trifling description will develop gout acutely. Fractures of the limbs rapidly produce a fit, and often within a short time of their occurrence. In the practice of the writer some years ago an anœmic, stout, but feeble lady of sixty-four years of age, who had suffered for a quarter of a century "from her eyes"—apparently gouty iritis and conjunctivitis—broke her leg, fracturing both tibia and fibula. The following day she developed articular gout for the first time in her life in both ankles. Her recovery was slow and painful. It is often seen that the so-called chronic rheumatoid arthritis in aged persons, follows after a fall on the hip, even without any crucial signs of fracture being present.

Gout modifies the character of many inflammations, specific and otherwise; and Sir James Paget[1] points out the simultaneous combinations of certain constitutional diseases, as two or more may co-exist in the same person, or combine into a hybrid or compound disease. Gout and tubercle may co-exist; gout and cancer are often found together, pursuing separate courses; gout and tertiary syphilis also are common enough; and each may be most effectually cured by combinations of mineral waters with iodide of potassium. Complete hybridity may be recognized in rheumatic gout.

Gout with syphilis; gout with struma; gout with cancer; gonorrhœal rheumatism in a gouty person;

1 Clinical Lectures and Essays.

gouty orchitis; gouty urethral irritation with retention and stricture; vesical calculi; gouty periostitis; gouty cystitis; gouty phlebitis; gouty psoriasis of the tongue; gouty pharyngitis, and an elongated thick glassy œdematous uvula; gouty eczematous ulcer; contractions of palmar, plantar, and subcutaneous fasciœ; and thickened bursæ over toes. All these have been pointed out by Sir James as common examples of surgical lesions influenced by gout.

Water as a diluent carries away from the system waste matter from the blood and tissues, and if drunk very hot and in the morning fasting, in the manner previously pointed out, it flows through the hepatic portal circulation, and stimulates the cells of the liver to an increased biliary flow. The Bath thermal waters doubtlessly act beneficially in these respects in the various well defined irregular manifestations of gout.

Sir James Paget, speaking of mineral waters, remarks "that the best of the mineral waters we use are enhanced in value by the exact regulations of light food before taking a bath; the temperature of the bath, and its uniform maintenance; the length of time immersed; the hour's rest in bed; the quiet morning following; and the judicious water drinking;" trite conclusions, all confirming the view consistently maintained in this book, that the virtues of the Bath thermal waters are due to their thermality, and to the careful and systematic carrying out of the varied modes of application and administration.

APPENDIX.

years is 2·641 or rather more than two inches and six tenths.

Sudden thaws after frosts of some continuance—and yet more after frosts of long continuance—are the occasions *generally* on which occur the greatest depressions of the barometer, and what is more, that the greatest elevations also, as well as the lowest, mostly occur in winter, and this makes it of interest to notice how far this is the case in tabulating the maxima and minima during the 11 years—1875 to 1885 inclusively.

The *maxima* occurred five times in January, twice in December, twice in October, once in February, and once in May. The *minima* occurred four times in February, three in November, twice in January, once in December, and once in April.

Thus not only are the greatest elevations and depressions clearly in excess in winter, but with the two exceptions of one elevation in May and one depression in April there are no extremes one way or the other to be found between the months of February and October.

The mean height of the barometer for each season on an average of eleven years is as follows :—

Spring	29·958
Summer	29·973
Autumn	29·961
Winter	30·010

Temperature.—The mean temperature of each of the eleven past years is as follows :—

YEARS.	MEAN TEMP	YRARS.	MEAN TEMP.
1875 ...	50·5	1881 ...	49·5
1876 ...	51·5	1882 ...	50·9
1877 ...	50·8	1883 ...	50·4
1878 ...	50·7	1884 ...	51·7
1879 ...	47·5	1885 ...	50·2
1880 ...	50·2		
		Mean ...	50·4

The mean temperature of these ten years correspond with the mean temperature of the previous ten, namely, 50·5. The year of highest mean temperature in the whole series of twenty years was in 1868, when the mean rose to 52. The year of lowest mean temperature was in 1879, when the mean fell to 47·5, three degrees below the average, and following the severest winter in the series, that of 1878 and 1879. Fourteen out of twenty years had a mean temperature of 50° or upwards, the remaining six had a mean below 50°.

With regard to the seasons, the following table shows the mean temperature of each season, deduced from twenty years observation, together with the highest and lowest means observed in each season, also the range.

SEASONS.	MEAN	HIGHEST	LOWEST	RANGE
Spring	48·4	51·2	45·8	5·4
Summer	60·3	63·5	58·1	5·4
Autumn	50·7	52·3	48·5	3·8
Winter	41.4	46·3	36·4	9·9

The warmest spring and the hottest summer in the series of twenty years occurred both in the same year, 1868, which year had also the highest mean temperature of all the years. The summer of 1868 was the hottest known in Bath. The nearest approach to it was in 1876, but the spring preceding that summer was nearly 4° lower than the spring of 1868. The mean summer temperature during sixteen out of twenty years was above 60°. With respect to the *range* of mean temperature in the several seasons, it is worth noticing that while the ranges of spring and summer are identically the same, the autumn

range, or difference between the highest and lowest mean temperature amounts to nearly 4°, while in the winter season the difference is greatly augmented, being nearly double that of any of the others.

A table is annexed showing the mean winter temperature of each of the twenty years observed :—

WINTER.	MEAN TEMP.	WINTER.	MEAN TEMP.
1866 to 1867	42·7	1876 to 1877	46·1
1867 „ 1868	40·8	1877 „ 1878	42·8
1868 „ 1869	40·3	1878 „ 1879	36.4
1869 „ 1870	38·9	1879 „ 1880	37·5
1870 „ 1871	38·0	1880 „ 1881	39·
1871 „ 1872	42·6	1881 „ 1882	43·
1872 „ 1873	41·1	1882 „ 1883	43·6
1873 „ 1874	42·1	1883 „ 1884	44·8
1874 „ 1875	39 0	1884 „ 1885	43·4
1875 „ 1876	41·2	1885 „ 1886	38·1

Analysing the above table it will be found that the coldest winter in the whole series of years was 1878 to 1879, when the mean temperature fell to 36·4, the next coldest being the winter following, that of 1879 and 1880, scarcely more than one degree higher than its predecessor, being 37·5. The two coldest winters therefore in the two series were two consecutive winters. The mildest winter was 1868 to 1869, following the hot summer of 1868, the mean being 46·3, or ten degrees higher than that of the coldest spoken of—the next mildest winter in the series being that of 1876 and 1877, the mean being 46·1, scarcely less than 1868 and 1869. Further, thirteen out of twenty winters had a mean of 40°. Seven did not rise to 40°, the former being in the ratio of nearly two to one, so that we may conclude that Bath winters are more variable perhaps than the other seasons, and they are as a rule mild. This is in keeping with the circumstance spoken of previously when treating of the barometer, viz., that the greatest elevations, as well as the lowest depres-

sions of that instrument, occur in winter, and therefore the range of the barometer is, as a rule, greater in winter than in the other seasons of the year.

The geology of the Bath district, and the configuration of the ground in the immediate neighbourhood of the city, matters of importance in estimating the climate of any place, need not be dwelt upon here.

The course of the river, and the circuit of the hills by which Bath is nearly surrounded, being open only to the west, are well known, and the river and hills, without question, have much influence on the climate. It has been mentioned that the distance of towns from high hills is one of the chief reasons of the increased heat in summer, and if this be correct, the hills around Bath may well be supposed to have a contrary effect in moderating both the heat of summer and the cold of winter. The interchange of heat, constantly kept up by radiation, between the slopes of the hills and town, would tend to check the cold arising from full exposure to the sky on cold frosty nights, as well as check the heat of a bright midday summer sun.

But, on the other hand, these same hills check a free circulation of air, and sometimes render the atmosphere rather oppressive in very exceptional weather. The difference between the night and day temperature in exact season is important, for the Bath climate has a slightly higher mean temperature than several other English towns in about the same latitude, or not very much N. or S. of that latitude, and owes its chief distinction to its more temperate character, or to its extremes of heat and cold lying within a more contracted range, which is notably the fact in very hot or cold seasons, and Mr. Blomefield, in a general way, adds that two places

having identically the same mean temperature may yet differ widely in climate, from the much greater heat in summer and the much greater cold in winter in one of the localities than in the other.

When the contrast between day and night is very great it is much felt by invalids, and is prejudicial to health in many ways, and where it is within moderate limits there is much less risk incurred by exposure to the outer air. For example, in a house, if a person passes from a heated room to one that is much colder, he feels discomfort immediately, whereas if the whole house be warmed throughout, though not to the extent of the particular room from which he came, no inconvenience is experienced.

It is, however, the *mean daily* range of temperature, not the *mean monthly* range, that is of most consequence in the conditions of a climate. Both these ranges are greatest in the warmer months of summer, lowest in the winter; but in these seasons the range varies but little, while it is the sudden rise or fall of the range when the day temperature is suddenly raised much above what it has been a short time before, the night temperature remaining the same, or perhaps lower, of which persons are ordinarily most sensitive, and this irregularity is found to occur in Bath in the spring. The cause is probably due to the prevalence of east winds, with a very dry state of the air, rendering the nights cold, notwithstanding the great power of the sun during the day to heat the lower strata of the atmosphere; hence it is the spring is so trying to all classes of invalids, and even to healthy people. Bath is not exempt from this evil, but whatever may be its increased mean daily range of temperature in spring, there is a still greater increase of the same

in several other towns in England, with corresponding greater disadvantage.

In ten years—1865 to 1875—Mr. Blomefield finds that the mean temperature of spring varies from 47·4 to 50·5, the range of the mean being 3·1. The mean temperature of summer varies from 60·0° to 63·5°, the range of the mean being 3·1°. The mean temperature of autumn varies from 48·5° to 52·7°, the range of the mean being 4·2. The mean temperature of winter ranges from 38·1° to 46·3°, the range of the mean being 8·2°. This leads to the inference that the winter season in Bath as regards temperature is more variable than any of the other seasons.

In selecting such towns as Oxford, Greenwich, Royston and Norwich, for comparison with Bath, we find that the mean temperature of Bath during the cold seasons of winter and spring is decidedly higher than these, and the difference is augmented as the towns lie more and more to the east. There is but little difference in autumn. In summer all these towns, as well as Bath, are nearly on an equality as regards the mean temperature, and Mr. Blomefield points out that two places may have the same mean temperatures and yet have different climates, arising from other meteorological conditions, especially conditions connected with the night and day temperature, and this holds good of any particular season, in which the mean temperatures are the same at the two places, while at other seasons they may be different. The chief characteristic of the Bath climate in summer, rendering the days not so hot, and the nights not so cold as in other places lying more to the east, is due to the more contracted mean diurnal change of temperature, but on comparison with the other towns mentioned

the autumnal difference is less apparent, and in winter it almost entirely disappears, and it may be asked, what gives the Bath climate an advantage in winter? It has been already shown that it has a higher mean temperature at that season, but in addition to this it will be seen that—just contrary to what takes place in summer—the mean of all the highest are higher, and the mean of all the lowest does not fall so low as in other places. The mean daily range remains the same, or very nearly so, from the circumstance of the mean extreme temperature, though both falling absolutely lower than in Bath, yet falling relatively to the same extent, so as to preserve the same difference (about 10 degrees), in all the towns, by which difference the mean daily range is measured. To sum up the chief advantages Bath enjoys over the other towns we have been comparing, Mr. Blomefield says that

Bath in Spring.—The mean temperature is higher while the night temperatures are not so low, and the mean daily range is less when compared with Royston and Greenwich.

Bath in Summer.—The mean temperature is not different from that of the other towns, but the extreme night and day temperatures are both of them more moderate, the mean daily range being still more contracted than in spring.

Bath in Autumn.—The mean temperature is only very slightly higher than in other places; the extreme day temperatures are scarcely as high as in some of them, but the nights are not so cold; the minimum not fully so low.

Bath in Winter.—The mean temperature is decidedly higher; the extreme day and night temperatures also both higher, though the mean daily range shows

scarcely any difference. It is, therefore, very clear that the hills surrounding Bath give it a very moderate temperature, both in summer and winter; and in summer, in very hot weather, if the free circulation of the air is materially interfered with, the heights of Lansdown, at an elevation of nearly 800 feet can be sought. The most humid months of the year in Bath are November and December; in spring the humidity lessens, falling steadily until May is reached, when the minimum is arrived at.

Observations on Lansdown (740 feet above the sea).—A register was formerly kept at *Ensleigh* on the summit of this high tableland by the late Mr. Charles Weston, and the results have been published by Mr. Blomefield; and although these results did not extend over more than three years yet they are not without interest and value. It was found that the mean temperature of the air during 33 months was lower on Lansdown than at the Bath Literary Institution—the mean difference being 2·9, making the former 3 degrees colder than the latter—and this difference prevailed during the summer and winter months. And further, not only was the mean temperature for the period in question lower on Lansdown, but the maximum and minimum temperatures were also lower. The mean of all the *maxima* at Lansdown was found to be lower in each of the several months with the exception of four. In three of the excepted months it is the same in both places. There is a greater difference in this respect in the winter months than in the summer ones. In the summer the difference is small—in winter the difference amounts to 1·3. The mean of all the *minima* is lower on Lansdown than in Bath in every month except two, and in regard to the mean there is no material difference between summer and

winter, the difference for summer being 2·4, for winter 2·7, *i.e.*, the night temperature on Lansdown falling as much below the night temperature in Bath at one season as the other, the difference in both cases being nearly as much again as the difference between the means of the highest day temperatures at the two places even in winter.

Taking all the seasons together the mean daily range of the thermometer on Lansdown, during three years, is exactly one degree and a half in excess of that at the Institution, owing chiefly to the greater depression of the night temperature at the former place.

Another notable circumstance is the larger quantity of rain that fell on Lansdown than in Bath during the recorded periods—the excess being 1½ inches. In one year, 1866, it amounted to 5 inches. This is not easily accounted for, the elevation of Lansdown being so much greater than the lower part of the city, and the quantity of rain usually diminishing with the altitude, but this rule which applies to different elevations above a level plain does not necessarily hold good in the case of differences of height due to hills and valleys.

The configuration of the country has probably something to do with this result.

Apart from the quality of the air, the hills therefore are to be recommended for summer residence, as the mean temperature is less than the town, but the town is to be preferred in winter as both warmer and drier at that period of the year, with a more limited range of temperature, the night temperature especially not falling so low as the hills—a matter of great importance to the invalid.

The late Mr. Clement Barter's records, taken during eighteen years, showed a mean temperature

of 50·5 being exactly the same as on the previous eighteen years which were placed on record and taken from the Institution observations.

Rainfall.—The average rainfall in the Institute Gardens at the end of twenty years is 32·064 inches, an excess of two inches in the latter ten years as compared with the former decade. In the first ten years, however, there were three very wet years; in the second there were seven such years, the fall in 1882 being more than 42 inches; this was the wettest year of the whole twenty, the difference of the two decades being in this way explained:—The driest year was 1870, the rainful not exceeding 21 inches; and the only other very dry year was 1873, the rainfall measuring 24,890 inches.

The following table represents the mean maximum and minimum rainfall in each of the four seasons during the twenty years' measurement:—

SEASONS.	MEAN.	MAXIMUM.	MINIMUM.
Spring	6·056	10·848	2·737
Summer ...	7·633	15·583	2·592
Autumn ...	10·008	14·302	4·227
Winter... ...	8·785	13·388	4·830

Autumn is therefore the wettest season in Bath. It has been proved that there is not much difference between the autumn and winter falls. The greatest spring rainful (10·840 inches), occurred in 1878, and the least (2·737 inches), in 1883; the wettest summer rainfall (15·583 inches), in 1879, and the driest in the series (2·592 inches) in 1870; the greatest autumn rainfall (14·302 inches), in 1885, and the least (4·227 inches), in 1884. The driest autumn in twenty years was succeeded by the wettest. The wettest

winter in the series was 1869, rainfall (13·388 inches), and the driest winter in the series 1878, rainfall (4·830 inches). 1878 was one of the five consecutive wet years, the heavy falls being in the spring, summer, and autumn months, especially in May. Autumn being the wettest season, there is but a trifling difference between September and October, comparing previous experience, namely, that on an average one of the two months of September and October is, comparatively speaking, a wet one, and the other a dry one. The highest mean monthly fall during 20 years was in January, therefore January is the wettest month of the year in Bath, though September and October may make a mean approach to it. The absolutely wettest month during the twenty years was May, 1878, the fall amounting to 7·060 inches, which may be considered a remarkable event, May and April being the two months in which the mean rainfall (nearly the same in each case), is lower than in any other months of the year. In only five instances, besides the above, did it amount to 6 inches. The absolutely *driest* month of the series was July, 1885, when the fall was 0.210 inches. There was no month without rain.

Heavy falls of rain in Bath being of short duration are not equal to the falls in the Eastern Counties or in the neighbourhood of London. The greatest fall in 24 hours in Bath does not usually exceed one inch and a half, and the greatest fall occurs in winter, and the least in spring. In different localities in Bath, such as Bathwick-hill and Swainswick for example, there is a considerable difference, and is clearly independent of the height above the sea, and the increase on Bathwick-hill compared with Swainswick may in part be due to the woods in the immediate locality.

Winds.—The most prevalent winds in Bath are those from the W.N. quarter, those next in frequency being the S.W., the least frequent being those from E.S.

Taking the mean frequency of each class of winds in several seasons the result appears to be as follows:—

SEASONS.	N.E.	E.S.	S.W.	N.W.
Spring	26·1	17·7	18·4	29·4
Summer ...	20·2	10·3	22·1	37·5
Autumn ...	23·0	12·3	22·1	30·5
Winter... ...	17·5	14·6	31·0	24·1

It will be seen that the N. and N.E. winds in Bath as in most other places in England attain a maximum in Spring and are the less prevalent in Winter. The S. and S.W. on the contrary attain a maximum in winter, least so in Spring. This is quite in accordance with the circumstance of the winter being the wettest, and the Spring the driest season. In Bath, as before shown, our chief rains come from the S.W. The W. and N.W. winds characterise the summer months, while in every season except winter they predominate.

S.E. winds attend transitional weather and are more frequent in Spring.

The N.E. winds in Bath are acknowledged to be less severe than those of the Eastern counties from the circumstance of Bath having a higher mean temperature, with higher temperature at night in the season when such winds chiefly prevail.

Bath is also sheltered from the full force of the north-east winds by the surrounding hills of Little Solsbury and Charmey Down, and from the north by Beacon, Sion, and Primrose Hills, and from the

great irregularity of the ground, winds, except the westerly, when blowing strong, are here and there deflected from their right paths, causing eddies and cross-currents in certain parts of the town, which make it difficult to say sometimes from what quarter the wind really blows.

Quality of the Air.—In extreme summer weather there may exist a difference as to the quality of the air to be found in Bath when compared with the ozone of the hills surrounding the city, ozone being always more abundant in the air of the mountain than of the plain. Bath is *not* a manufacturing town, therefore ozone present in the city is not destroyed by smoke and other impurities, but it is indisputable that the higher we advance up the hills the purer and more invigorating air is experienced, the refreshing odour of the woods, and the cooler breezes of the downs on the north and south sides of the city abound in ozone, and probably in very large quantities. Some observers say ozone is greater in winter than in summer; in spring than in autumn; while according to others it is greater in spring and summer than in autumn and winter, and there is an equal uncertainty as to whether it is greater in the day than in the night, or the reverse.

Bath may be used all the year round for water patients and many other invalids. The limit of the season to the period of eight months, from October to May inclusive, is no longer adhered to. For lung cases, its mild temperature, and the rapidly absorbing character of the soil, its sheltered position from the north-east winds, and the attraction of the new *Salles de Inhalation*, at the New Massage Baths, renders Bath of great practical value in winter in the treatment of diseases of the chest.

Modern Bath being built on the slopes of lofty hills affords every variety of aspect, and almost any variation of climate within the before mentioned limits, and the statement circulated a century ago by Heberden "that Bath is relaxing" is now recognised as traditional, and not existing in fact.

MORTALITY.

BATH URBAN SANITARY DISTRICT.

POPULATION—CENSUS 1881—51,790.

Comprising—Registration Sub-District of Walcot, Lyncombe and Widcombe, and Bathwick.

Death Rate per 1000 of Population for 10 years, from 1877 inclusive:—

	MORTALITY FROM ALL CAUSES.		ZYMOTIC MORTALITY.
1.	1877—21·6	—	2·1
2.	1878—22·4	—	1·4
3.	1879—21·07	—	1·5
4.	1880—20·4	—	1·9
5.	1881—18·7	—	0·9
6.	1882—20·03	—	0·6
7.	1883—21·3	—	0·8
8.	1884—19·8	—	1·1
9.	1885—20·03	—	0·5
10.	1886—18·03	—	0·4

Average Mortality for 10 years per 1000 Annually:—

1. From all causes .. 20·3 | 2. Zymotic Mortality .. 1·1

With the exception of three years the above is the *gross* mortality annually, including Deaths in all Public Institutions, such as the Hospitals and Workhouse, many of these being deaths of persons not of or belonging to Bath. If these deaths were eliminated the strictly Urban Mortality would be reduced to about 17 per 1000 annually, and the Zymotic Mortality to about 0·7 per 1000 annually.

A. B. BRABAZON,
Medical Officer of Health.

THE BATH ROYAL MINERAL WATER HOSPITAL.[1]

IN any work treating of the Thermal Baths of Bath, and of the Bath Waters, it would be an omission not to notice the Bath Royal Mineral Water Hospital.

This institution was established for the relief of poor persons from any part of Great Britain and Ireland afflicted with complaints for which the Bath Waters are a remedy. Its erection was commenced in 1738, but it was not open to patients until 1742; and during a period of 137 years has been the means of affording a great amount of relief to the sick and helpless. Mr. Ralph Allen, of Prior Park, delivered free of cost, from his quarries on Combe Down, all the stone required for its erection, besides contributing on several occasions large sums towards its maintenance. Mr. Wood, the architect, gave all the several draughts, plans, and other papers relating to the Hospital, together with his care, labour, and the cost of surveying and directing the building, as a free gift and benefaction; and this generous action was further enhanced by the addition of a considerable donation of money. Mr. Richard Nash, better known as "Beau Nash," was unwearied in his exertions to collect subscriptions and donations, and succeeded in a few years in obtaining more than £2,000 for the charity.

1 This chapter is substantially reprinted from Dr. R. W. Falconer's Manual of the Baths of Bath.

It is a National Charity, and one of its peculiar features is that no interest is required to gain admittance to its advantages—no recommendation of Subscribers, Governors, or any other person. All that is necessary is that the persons who desire admittance be in such condition of life that the expenses attendant upon a residence in Bath would be more than could be afforded by them; that they are proper objects of charity; and that the Waters are applicable to their cases. The Hospital, since the alterations and additions were completed in 1861, provides accommodation for 142 patients—85 males and 57 females. They are gratuitously supplied with medical and surgical advice, food, washing, medicines, and the attendance of nurses. In consequence of the increasing number of applicants, arising partly from the extension of railways, and partly from an increasing appreciation of the efficacy of the Waters, the want of better and adequate accommodation was much felt, and the Governors decided on making considerable alterations and additions to the Hospital, and converted the whole of the old building into dormitories, and erected male and female day wards, a feature not by any means yet common in our Metropolitan or Provincial Hospitals—a suitable chapel, and a convenient airing-ground for the patients. For effecting these objects it was necessary to have recourse to the public for assistance. As a National, not a local charity, it has just claims upon public support. It is the only institution of its kind in the kingdom, and by its means the use of the Waters is gratuitously provided for the afflicted poor of every parish. It requires the support of voluntary subscriptions and donations.

In order to obtain admission into the Hospita it is necessary to forward to the Registrar a report of

the case containing the name, age, occupation, and parish of the applicant; the name and brief history of the disease, comprising its origin, date, progress, and treatment; the present symptoms, stating the parts principally affected, and to what extent. In cases of Paralysis, the condition of the sphincters, memory, and speech should be noted; also the state of the patient's general health; and whether the complaint be accompanied with cough or spitting of blood; Heart disease—if valvular, the particulars should be stated; Brain disease, as evinced by Epilepsy, &c.; Acute Inflammation of any part; Fever; Abscess; Suppuration of the Joints, or Ulcer of any kind. If the case be approved by the Medical Board, it will be admitted in its turn after compliance with other regulations, such as certificates of the civil condition, &c., of the patient, forms for which may be obtained on application to the Registrar at the Hospital.

The Institution has, on the whole, had a singularly tranquil and happy career. The good that it has done is incalculable. From its establishment until now it has been a noble monument of the generosity of past and present benefactors, and above all it is the most striking illustration of the blessings of Providence in the healing gift of the Thermal Waters. Recently Her Majesty has accorded her gracious permission that the prefix Royal shall be added to the designation of this valuable institution.

GRAND PUMP ROOM HOTEL, AND THE NEW ROYAL SUITE OF BATHS.

THIS Hotel stands upon the site of the White Hart; or, perhaps, more correctly speaking, we ought to say that the old White Hart occupied a *part* of the site which is now covered by the Hotel. The White Hart was not without its interesting history and associations. Of the present hotels, the York House, the Christopher, the Castle, and the White Lion, have all a long past, and are more or less identified with the city and the romantic episodes and adventures of the past and present centuries. The White Hart was the oldest inn in the city, although there was nothing venerable in its appearance, for when, in 1789, an Act was obtained to enable the Corporation to effect street improvements, the ancient front of the inn was removed and a plain ugly one substituted. In 1692, the famous old physician, Dr. Robert Peirce, engaged Gilmore, of Bristol, to survey the city, and to take drawings of the principal edifices. In 1694, the map, with these houses surrounding it as a border, was published by Peirce, with his work, "The Memoirs of the Bath," and in that border appears the White Hart, but it had been in existence then more than a century. The earliest name connected with it is that of Brookman, and he was succeeded by Eleazer Pickwick, who had been for many years a post boy at the Bear, and was there during the visit of Smollett. The Bear was pulled down in or about 1797. The name of Pickwick

was associated with the White Hart for nearly three-quarters of a century. The readers of "Pickwick" will remember the astonishment of Sam Weller when the coach stopped at the White Hart, which had brought him and his revered master to Bath, and he saw the name of Pickwick over the door. The livery of the White Hart waiters was a sort of black plush. During the youthful days of Disraeli and Lytton they arrived at the White Hart, and at dinner startled the waiters by appearing in silk velvet suits of the colour of the waiters' liveries. It was cotton waiting upon silk.[1]

The White Hart was closed in 1864, pulled down in 1869, and in its stead was built the Hotel, in which, gentle reader, you are, it may be, reading this account of its predecessor, which had played its part from the days of "good Queen Bess." The Grand Pump Room Hotel, with all its ample and admirable arrangements, so far as we are concerned, must have been left to tell its own story, if its important connection with the Baths had not demanded our particular notice. One of the great advantages of continental watering places consists in the fact that the Baths are always associated with the Hotels, which offer every facility to invalids to avail themselves of the bathing without leaving the

1 The following letter relating to this visit will be found in Lord Beaconsfield's correspondence with his sister:—"Bath, January 19, 1833.—Bulwer and I arrived here on Monday, and have found the change very beneficial and refreshing. Such is the power of novelty, that the four or five days seem an age. I have written about fifty pages of a pretty tale about 'Iskander,' which will form a fine contrast to 'Alroy.' The type and page of 'Alroy' most original, striking and beautiful. We are great lions here, as you may imagine, but have not been anywhere, though we have received several invitations, preferring the relaxation of our own society and smoking Latakia, which as a source of amusement, I suppose, will last a week. I like Bath very much. Bulwer and I went in late to one public ball, and got quite mobbed."

premises, and consequently without exposure and the danger of catching cold. So it is with the Grand Pump Room Hotel. The experiment has here been tried on a grand scale and its success is proportionately great.

There is a communication from the Hotel, on the ground floor, with the entrance lobby of these suites of Baths, and a lift, by means of which infirm invalids can be brought down from the landings of the Hotel to a level with the corridor, through which, in a merlin chair, an invalid may be wheeled to the baths or douches. The whole of this establishment is heated, when necessary, by hot water pipes.

The arrangements are extremely good, and, without undue partiality may be said to equal, and, as far as regards the conveniences for bathing, exceed what is found at Continental Spas.

SULIS WATER, IN ITS MEDICAL AND GENERAL ASPECTS.

ATTEMPTS to aërate the Bath Waters have until now only imperfectly succeeded, or altogether failed, partly owing, it may be, to inadequate machinery, and partly to the fact that no sufficient prospect of final success existed to stimulate the efforts of those by whom they were made.

In aërating the Bath Waters the experiments have been made under exceptionally favourable conditions. No expense has been spared, the lessee has been privileged to intercept the Waters at their source, whilst the most perfect appliances have been used, together with eminent scientific assistance, not perhaps open to those who have conducted former experiments. The experiments have succeeded beyond all expectations, notwithstanding the anticipation of many scientific men who predicted failure. In 1878, the British Medical Association met in Bath, and on that occasion the lessee submitted to that learned body the first perfect example of Sulis Water.

The aëration of Mineral Waters is by no means novel. It has been attempted more or less successfully in the case of many natural Mineral Waters, sometimes for the purpose of making them more agreeable to the taste, and at others to prevent them from deteriorating or decomposing by time; but in the case of the Bath Waters, neither of these is the object in view, and without wishing to be tedious, the real reason is here scientifically explained.

The Mineral Waters of Bath present the paradox of being at once the most permanent and yet the most unstable of fluids—permanent, because no appreciable

change has taken place in their constituents since their discovery ages ago, but yet unstable, owing to the fact that from the moment of issuing from their source a change takes place, which progresses as the water cools by a process of oxidation from contact with the air, but which, by the system now brought before the public, can be *prevented*. These waters, among other constituents, contain iron, but in a peculiar and more than usually active form—namely, that of Carbonate of Iron. This substance is of a highly evanescent character. It can easily be prepared in the laboratory, but, to use the words from a well known treatise on Chemistry, "it cannot be washed and dried without losing carbonic acid and absorbing oxygen. Such waters are known by the rusty matter they deposit by exposure to the air." This latter fact is well known to those who have taken the Bath Waters: the peculiar discoloration on the drinking glasses used at the Pump Room is due to a deposit of what originally was Carbonate of Iron, but which, having lost its carbonic acid by decomposition, now assumes the form of the almost inert oxide.

Now, it is a well-known medical fact, that the administration of the Carbonate of Iron in mineral water is often more beneficial as a chalybeate than a much larger quantity of other ferruginous compounds, but its instability which we have explained prevents its use as a medicine. The Bath Waters contain this substance when drawn from the spring, but in a few minutes or, at most, hours they no longer contain it, but in its place a small quantity of oxide.

To remedy this defect, and to enable patients at a distance to reap much of the advantages of a visit to Bath, is the object of this process of aëration. The change of Carbonic to Oxide of Iron will not

take place in the presence of Carbonic Acid Gas, and therefore advantage has been taken of this chemical fact to saturate the Waters with this gas, and thus to preserve them (with the exception of temperature) in their original state as they issue from the spring.

It should, however, be stated in the strongest manner that this process makes *no alteration whatever* in the chemical constitution of the Waters. In drinking Sulis Water, a person is drinking Bath Water, pure and simple, *plus* Carbonic Acid Gas, this addition having a threefold object—1st, to render the Water a refreshing and agreeable beverage; 2nd, to maintain their medical virtues unimpaired for any length of time; and 3rd, and most important of all, to preserve one of their most important chemical constituents in its original activity as when bubbling from its natural source.

To those who are unable to visit the Baths and obtain the benefit of the combined external and internal use of the Waters, we strongly recommend a prolonged course of Aquæ Sulis, as the next efficacious thing to a visit to the city, and in those mild but troublesome conditions of skin irritation, which arise from many causes—change of season, alteration of temperature, disordered digestion, &c.—these Waters, regularly taken for a few weeks, will not only be a pleasant and cooling beverage, but a most valuable remedial treatment. Indeed, there are few cases of skin disease which will not receive benefit from their administration. It is an excellent tonic, does not distend or weaken the stomach, and it must be emphatically observed that, independent of all medical considerations, experience shows that there is no mineral water that is more agreeable or more suited to the robust and healthy than *Sulis Water*.

BATHS OF POMPEII.

[With Lucas's Plan of the Roman Baths is given an illustration of an ancient Roman caldarium. This differed considerably from the caldarium attached to Roman Thermæ in this country, because the water was cold and required artificial heat to give it the required temperature; moreover, the object of all the ingenious methods of bathing, both in Rome and Pompeii, was pure and unadulterated luxury.

THE Baths of Pompeii[1] were unexampled in their magnificence. There was an apartment for the use of those who frequented the hot baths, which was entered by a door opening from the tepidarium, which closed by its own weight, and it is probable, was generally shut, to prevent the admission of cold or less heated air. Vitruvius says that the laconicum and sudatories ought to join the tepidarium; and that, when these were separate rooms, they were entered by two doors from the apodyterium.

This chamber, though perhaps not decorated with all the art displayed in the tepidarium, because the constant ascent of steam would have destroyed the colours of the ceiling or vault, was nevertheless delicately ornamented with mouldings of stucco, which have an elegant and beautiful effect. The view of this chamber is given in Gell (plate xxxi.) It is taken from the warm bath, and the alcove with the labrum form the principal objects.

Not only is the pavement suspended in the manner recommended by Vitruvius, but the walls are so constructed that a column of heated air encloses the apartment on all sides.

This is not effected by flues, but by one universal flue formed by a lining of bricks or tiles,[2] strongly connected with the outer wall by cramps of iron, yet distant about four inches

1 From Gell's Pompeii.

2 This to some extent is illustrated in the plan of W. Hoare, of which we have given a *fac simile*. This plan reveals features in the Baths of 1755, which enhances the regret and indignation every antiquarian of the present day must feel at their destruction.

from it, so as to leave a space by which the hot air might ascend from the furnace, and increase, almost equally, the temperature of the whole room.

Some parts of this casing having fallen, the whole of this admirable contrivance is now apparent; and the pavement having, in some places, been forced in by the fall of some part of the vault, the method of suspending it was, at the period of the excavation, sufficiently visible. In the view, in Gell, (plate xxxi.), it will be observed that scarcely anything was placed in symmetry with the centre—the circular window in the alcove, with its ornamental dolphins in stucco, being to the left, and the two side windows, in the vault, being neither equal in size nor situation.

This may be accounted for by supposing that these holes were pierced in the vault, in places where fewer obstacles to the transmission of light existed on the exterior of the roof above. The walls are painted yellow, with pilasters and cornice in red, and the alcove is prettily decorated with coloured panels or compartments, in relievo, generally painted alternately in blue and red, and adorned with figures ill preserved, as may be seen in the view.

Vitruvius directs that, on account of the penetrating vapour, the roof of the caldarium should, if possible, be stone. He recommends also certain precautions, where that cannot be effected. The most striking object in the apartment is the labrum, placed in the centre of the alcove, which forms one extremity of the caldarium, as the hot water bath. This consists in a vase or tazza of white marble, not less than eight feet in diameter, and, internally, not more than eight inches in depth In the centre is a projection, or umbo, rising from the bottom, in the middle of which a brass tube has thrown up the water, which, judging from the customary process in an oriental bath, was probably cold, or as nearly so as was judged expedient for pouring upon the head of the bather before he quitted this heated atmosphere.

This is supposed in the East a necessary practice; but it must be understood that the water is by no means cold, except by comparison.

It is not a little remarkable that this circular basin of marble is placed on a mass of volcanic stone of oval form, which, besides being too bulky for the tazza, injures its appearance by hiding a portion. It is not impossible that certain cracks in the marble may have suggested the adoption of

this precaution to prevent the increase of the evil. The labrum was presented to the thermæ of Pompeii by a private individual, whose name, together with the value, is inscribed in letters of bronze yet remaining on the lip of the basin—

CN. MELISSAEO. CN. F. A. PRO. M. STAIO.

M. F. RVFO. II. VIR. ITER. ID. LABRVM.

EX. D.D. EX. P.I.F.C. CONSTAT. HSP.. C.C.L.

The position of this labrum seems, in some respects, to accord with the instructions given by Vitruvius for the construction of such a vase:—"Scholas autem labrorum ita fieri oportet spaciosas ut cum priores occupaverint loca circumspectantes reliquæ recte stare possint."—Vit. l.v.c.x. He says also—"Labrum sub lumine faciendum videtur ne stantes circum suis umbris obscurent lucem." Even this, as applied to our labrum, is not very intelligible. Andreas Baccius, who has written and collected much of what the ancients have left us on the subject of baths, says that some labra existed made of glass; and he very sensibly concludes that all the great tazza of Rome, like that at present on the Quirinal, were originally the labra of the public or private baths of the city. Ficoroni mentions labra in Rome of basalt, granite, porphyry, and alabaster, and observes that many of these had a lion's head in the centre. Mention is also made of the labrum in a private bath by Cicero, in a letter to his wife, Terentia:—"Labrum si non est in balneo fac ut sit." The opening for the lamp, which has been formerly noticed as giving light, on one side to the Doric portico, and on the other to the caldarium, is visible above the labrum, and had, anciently, a convex glass to prevent the entrance of cold air from without. The view (plate xxxi.), which was taken with the camera lucida, will give an idea of the proportions of the semi-circular and chamber, which is thirty-seven feet long by seventeen feet four inches in breadth. Having been taken from the hot bath at the north end, the first objects in the foreground are the step and the brink by which the bathers entered it. The surbase, or plinth, is ten inches high, and the wall is seven feet high up to the lowest cornice, which is, like the pilasters, painted red.

From the pavement of the Caldarium, which was of white tesseræ, with two small borders of black, bathers ascended by two steps so as to sit down conveniently upon the third or marble wall, one foot four inches broad, which formed the brink of the vase or vat of hot water.

Thence one step dividing the whole depth of the cistern not exceeding two feet and half an inch, permitted them to immerse themselves by degrees in the heated fluid. The whole length of the cistern is fifteen feet and the breadth four. About ten persons might have sat upon the marble pavement, without inconvenience, at the same moment, immersed in the hot water. It is evident, from the shallowness of this cistern, that persons must have sat on the pavement in order to have been sufficiently immersed; and accordingly, the side next the north wall is constructed with marble sloping like the back of a chair in an angle well adapted to the support of the body in that position. Hot water entered this bath at one of the angles, immediately from the caldron, which boiled on the other side of the wall.

There appears to have been a moveable stone in the pavement, near this cistern, possibly for permitting the entrance of a column of hot air on certain occasions. This chamber, from the water which must have fallen upon the pavement, and the distillation caused by the vapour from so great a quantity of heated liquid, must have always been wet, and must have had an outlet, called fusorium, to which the floor inclined. Perhaps the opening near the hot bath served in part for this purpose. The floor was found much damaged and broken in by the fall of a part of the arch on its first discovery.

The seats in this chamber were probably of wood, as the whole must have been constantly in a state of humid heat which would have corroded furniture of bronze like those of Vaccula in the tepidarium.

In that portion of the vaulted roof yet remaining are no fewer than four openings for the admission of light and the transmission of hot air and vapour.

These must have been glazed, or closed, with linen windows, called vela, for it was probably previous to that common use of glass which evidently prevailed at Pompeii, that the brazen shields or circular shutters, mentioned by Vitruvius as hanging by chains, for the purpose of opening and shutting the windows of the laconicum or sudatory, were

necessary. It appears from that author that these shields were lowered to open, or raised to close, the circular openings in the roof of the laconicum. Over the labrum is seen one of these circular windows. An author named Robortellius, in the collection of Graevius and Gronovius, says that the openings in the roof of the baths of Pisa are yet visible, and are, some of them, six feet in diameter. In the Moorish baths at Granada, in the palace of the Alhambra, a number of small orifices exist; and, in Turkish baths, these holes are generally numerous and covered with convex glasses. It is evident that, when the vaults were entire, none of these apartments could have been supplied with a cheerful light; and that when the brazen shields were in use, the darkness must have increased with the increase of temperature.

In some instances these shields seem to have condensed the vapours, and caused them to fall in showers; and this, which must have followed of course, is mentioned to have happened in the hemisphere of the laconicum.

It may be supposed that in an establishment so small as this at Pompeii, this iron room, or caldarium, might unite in itself more than one of the numerous appellations in use in the Roman capital.

The caldarium seems to be the hot bath, the absolute vessel of hot water, the λουτρῶν or lavacrum; but this was always close to the laconicum, "Ex laconico aditus in caldarium." The words, however, caldarium, vapirarium, sudatoroum, and laconicum, seem to have been often indiscriminately used, to say nothing of hypocaustum, which, at Pompeii, applies equally to the tepidarium, and signifies, in fact, any chamber heated by subterraneous flues. They were, as it was said, first invented by the Sybarites, and, in private houses, were called ἀποθήκας ἑδωμας.

Wilkins says tha the laconicum is a circular stove; and it certainly appears that it was often circular and full of warm vapours from stoves and hot water. A certain Oribasius observes that the laconicum was very hot, yet exceedingly humid, which proves that he alluded to a bath where the laconicum and caldarium were united like this at Pompeii. Under the pavement of the laconicum was the furnace ὑπόκαυτον.

The laconicum, even in baths of great dimensions, seems to have been often small, as many persons preferred producing

the perspiration by exercise. For this purpose such thermæ were provided with all the adjuncts of palæstra, xysta, ephebium, corycæum, conisterium, sphæristerium, peristylia, theatre and other endless divisions, which augmented the imperial thermæ of Rome to the size of moderate towns, but which have no existence at Pompeii. The presence of so many of these apartments has been the cause of the difficulties which have arisen in comprehending the accounts of the ancients. It was the custom to perspire first, and, after the operation of the strigil, to resort to the warm water bath. The strigil is well known to have been a sort of concave and sickle-shaped scraper, made of bone, iron, copper, or silver, for cleansing the skin from the copious perspirations caused by the laconicum. It was by no means a very agreeable operation, and Suetonius says Augustus was a sufferer by its having been too roughly used. Its place is now supplied, in a Turkish bath, by a sort of bag or glove of camel's hair, which, without pain, peels off the perspiration in large flakes, and leaves the skin in a most wonderfully luxurious state of softness and polish. Persons of quality carried with them their own apparatus.

[Some idea will be gained of all these ingenious arrangements by the beautiful plan of the Roman Baths (1755), by W. Hoare, of which a *fac simile* is given in the body of the work, the details of which are much more full and finer than anything yet published.]

THE BATHS OF CARACALLA.

(With Illustration).

[Quoted, by special permission, from Audsley's masterly work on Architecture.]

THE accompanying plan is taken from that given in Blouet's great work;[1] and, although not complete in its south-west portion, it is sufficient for our present purpose. The portion omitted comprises the castella or water cisterns which supplied the baths, elevated seats for those who viewed the games in the zystus, courts, and apartments for the use of the athletae.

The principal entrance to the establishmeut was in the centre of the north-east façade; this conducted from the outer vaulted portico, which extended the entire length of the façade, to groves or plantations, *h*, arried round three sides of the main buildings, and terminating in the zystus, *g*. The apartments, *a*, opening from the portico, were bath rooms for those who preferred to bathe in private. There were two stories of these rooms, the upper story being reached by the several stairs, *b*. At each end of the zystus was a partly enclosed court for gymnastic exercises, *e*; attached to which was what are supposed by Cameron to have been an academy, *c*, and a hall for discussions, *d*. The latter apartments were connected by curved porticoes.[2] Two exedrae

1 *Restauration des Thermes d'Antonin Caracalla a Rome*, par G. Abel Blouet. Paris, 1828.

2 On an altar stone found in the Cross Bath (Bath) on September 12, 1885, at a depth of 20 feet, the figures of the Serpent and the Dog are strongly suggestive emblems of the worship of Æsculapius. In a valuable contribution to the Bath Natural History and Antiquarian Field Club, by the Rev. H. H. Winwood, he shows how much the serpent enters continually into the ancient sculptures found in Bath. The engravings of the sculptures given by Guidott in his work, the originals of which were in the City walls, contain two representations of figures, one of which, apparently a nude female, carries two serpents. The other,

opened from the groves opposite the ends of the main buildings. The thermae proper were entered from the groves by four principal doorways in the north-east façade, and four lesser lateral doors. The principal doorways opened into large vestibules, B, divided by columns only from the great frigidarium with its swimming bath, H. Inner lobbies, G, led from the vestibules to the apartments, K, at each end of the central hall or great tepidarium, I. The other doors opened into vestibules, R, attached to which were apartments for conversation, or perhaps waiting rooms, S.

The frigidarium was an uncovered apartment, about one hundred and seventy-six feet long by seventy-five feet wide, exclusive of the recesses on its south-west side. The swimming bath occupied its entire area, and was entered by steps from the vestibules, B, and the central hall. The central hall, or great tepidarium, I, was vaulted and elaborately decorated; it measured about one hundred and eighty feet by seventy-eight feet, exclusive of large lateral recesses. In four of these recesses were baths, probably of tepid water; and in the central ones were large circular labra or fountains. From the central recess, on the south-west side, doors gave access to a smaller tepidarium, L, most probably of a higher temperature than the central hall; and introduced with the view of assisting the body to bear the still greater heat of the caldarium, M. Warm baths were provided in the lateral recesses of this small tepidarium. The adjoining portions, marked X, were open courts for light and air, and also for stoking the furnaces which heated several cisterns, shown in the thickness of the walls. Two entrances, protected by double doors, gave access from the intermediate tepidarium,

---

also a female figure, is clothed and carries one serpent. Two heads are represented as covered with hair formed of serpents, serpents also being sculptured in the hair and beard of the head of Medusa, which formed the centre of the pediment of the temple, the remains of which are now in the portico and in other parts of the Bath Literary and Scientific Institution. All these seem to be symbolical of the healing properties of the Bath Thermal Springs, which for centuries have been so celebrated, and granted, as Solinus expresses it, *ad usus mortalium*. The Dog also was not only a symbol of Æsculapius, but represented the Dog Star (κυων) adopted by the Romans from the Greek, indicating the passage of the Sun into the constellation Leo.

L, to the great caldarium, M. In the centre of this circular apartment, which was about one hundred and fifteen feet in diameter, was constructed the large balineum or hot water bath; and in the recesses round the circumference of the apartment were smaller baths, in all likelihood supplied with water of a different temperature from the central basin.

Returning to the façade of the building, it will be seen on reference to the plan that the vestibules, R, led into large peristyles, A, the porticoes of which extended round three sides. Opening from these were large semicircular exedrae, T; opposite which, on the sides where there were no porticoes, were suites of apartments, W, the use of which is rather uncertain; they were probably ephebia, or rooms in which young men exercised. Opening from the south-west portico of each peristyle was a suite of six apartments. The first apartment, F, was a frigidarium, containing a square cold water plunging bath; the second, U, was uncovered, and probably used as a place for exercise in fine weather; the third, O, was a covered apartment for exercise when it rained; the fourth, N, appears to have been a tepidarium, communicating with the great caldarium, and having a bath in its floor; the fifth, P, was a small room of warm temperature, for the purpose of preparing the body for the great heat of the sudatorium, or last apartment of the suite, Q. The apodyteria of this immense establishment were conveniently situated at C, immediately accessible from the four principal vestibules. Opening from them were rooms, D, for keeping the clothes of the visitors; elaeothesia, or anointing rooms, E; and conisteria, or rooms in which the youths about to wrestle were anointed and sprinkled with sand, F.

Portions of the thermae were of two stories in height, but nothing is known as regards the use to which the upper apartments were put. The staircases shown from the rooms, D, probably led to apartments in which ranges of lockers were constructed for holding the bathers' garments; considerable accommodation must have been required in this department.

The castella, or water cisterns, which supplied the baths, covered on area of ground measuring about sixteen hundred square yards. The cisterns were sixty-four in number, constructed in two stories, and vaulted throughout. The lower range was heated by a hypocaust extending under the entire floor, and by flues constructed in the dividing walls. The upper cisterns were probably heated slightly by the ascending wall-flues, and perhaps also by steam brought into contact

with the water from the lower cisterns: accordingly, the water in the upper cisterns would be suitable for the tepid baths. In what manner the upper range was connected with the lower, if connected at all, is to our minds very doubtful; we are strongly of opinion no connexion existed which would allow the heated water to ascend and accordingly circulate.

The thermae of Caracalla covered a site measuring about eleven hundred feet square, exclusive of the castella, projected from its south-west side. According to Olimpidorus, they accommodated sixteen hundred bathers at a time.

The following list contains the names of the principal thermae built during imperial times, and the approximate dates of their erection.

The Thermae of	Agrippa	built	B.C.	24
,,	Nero	,,	A.D.	65
,,	Vespasian ..	,,	,,	68
,,	Titus	,,	,,	80
,,	Trajan	,,	,,	110
,,	Hadrian	,,	,,	120
,,	Commodus ..	,,	,,	188
,,	Caracalla ..	,,	,,	212
,,	Alex. Severus ..	,,	,,	229
,,	Decius	,,	,,	250
,,	Aurelian	,,	,,	272
,,	Diocletian ..	,,	,,	302
	Constantine ..	,,	,,	325

FROM WEY'S "ANCIENT ROME."

THE BATHS OF CARACALLA AND POMPEII.

UN des monuments les plus considérables qui soient au monde, ce sont les Thermes d'Antonin Caracalla situés à l'extrémité du Grand Cirque, entre le revers de l'Aventin et celui du Cœlius, dans un de ces faubourgs démeublés où des champs et des jardins verdissent sur la sépulture des quartiers antiques. Etalés dans un vallon, mesurant leur hauteur avec la stature des collines, ces thermes sont la plus belle ruine de Rome. It est resté des portions tellement considérables des deux principales bâtisses, formant l'une dans l'autre deux massifs carrés entre lesquels, s'étend l'espace d'un vaste préau bordé de portiques, qu'à l'aide des Thermes de Caracalla on est parvenu à retrouver l'appropriation des édifices analogues de Titus et de Dioclétien.

On aurait de ces sortes d'établissements une idée fausse, si prenant les choses au pied de la lettre, on n'y voyait qu'une maison de bains luxueuse et très complète. Assurément les étuves y tenaient une place notable, puisque, d'après Olympiodore, les Thermes de Caracalla pouvaient échauder à la fois seize cents personnes ; mais ce n'etait là que le prétexte d'un monument dont les portiques, selon Lampridius, n'ont été érigés que d'Héliogabale à Alexandre-Sévère. Outre les bains à diverses températures, les chambres à transpirer chauffées par la vapeur et les piscines et les fontaines, on trouvait aux thermes des boutiques à parfums, des magasins où affluaient les articles de mode, des buffets pour les rafraîchissements, des cuisiniers et des réfectoires, des péristyles pour les entretiens et pour la promenade en temps de pluie, des empyriques et des officines, des bibliothèques et des salons de lecture, le théâtre pour jouer la comédie, des gymnases d'exercice pour les athlètes, une arène pour les courses et les luttes ; on avait rassemblé là, et fait desservir par un personnel nombreux de virtuoses, d'artistes, d'esclaves et de phrynés, tout ce qui peut divertir un peuple oisif et lui faire oublier la vie. Il y avaft même des pinacothèques et des musées de statues ; c'était le plaisir élevé au rang d'institution et organisé dans un plan d'architecte Pour des souverains qui avaient à

maintenir une puissance aussi absolue que fragile sur une population corrompue où la foi en la patrie n'avait pas même surnagé, la répartition en grand des divertissements communs était un intérêt politique au premier chef. Aussi plus la nation s'abaisse et se vautre, plus l'administration de la volupté croît en importance : ces despotes ne pouvaient se maintenir qu'en devenant des proxénètes. Continués par Héliogabale, les Thermes de Caracalla sont les plus magnifiques de tous : plusieurs milliers de citoyens pouvaient y épuiser chaque jour le cycle varié des jouissances de l'esprit et de la sensualité.

Les bâtiments extérieurs formaient un périmètre de quatre mille deux cents pieds. Dans la cour interceptée par ces constructions s'élevait, sur des voûtes babyloniennes, un autre édifice à plusieurs étages, lequel avait près de sept cents pieds de long sur quatre cent cinquante de large. Le *Caldarium*, rotondé éclairée du haut comme une serre, n'est comparable qu'au Panthéon d'Agrippa, plus pur en son ornementation, moins hardi comme structure. Ce qu'on ne peut dépeindre, c'est le spectacle imposant, le matin ou le soir, de ces gigantesques pans de murs quand, sur des parements déjà plongés dans l'ombre, leurs cimes infléchies qui ont porté des voûtes ne partagent qu'avec le sommet des monts les rayons du soleil. Les angles conservés des corps de logis simulent des clochers, des flèches, des tours dont on peut faire l'ascension grâce à des escaliers intérieurs, et sur "étroite plate-forme desquels on circule par de minces allées bordées de lentisques, de genêts, de corollis, de lauriers-tins entremêlés de giroflées jaunes et de tiges de *finocchio* : ourlets de fleurs qui masquent de chaque côté l'abîme à vos pas retentissants, sous lesquels chante le vent sonore. Si parfois on est forcé de sonder le précipice, on sera presque effrayé devant cette ronde de spectres géants ; la projection jusque bien loin de l'ombre qui descend des arêtes grêles, vous révèle plus encore la dimension colossale de ces débris égrenés par le temps. Quelques-unes de ces arches ont laissé comme en équilibre des nervures cintrées, ponts aériens sur lesquels on se risque en surmontant quelques tentations vertigineuses. En bas, les cours, les salles détruites à demi ont gardé d'admirables pavés en mosaïque ; ceux de l'exhèdre des Gymnasiarques sont célèbres : ils représentaient les portraits des athlètes victorieux ; nous les verrons dans une salle du palais de Latran. Aux plates-formes les plus élevées, vous marchez sur d'autres mosaïques : ces crêtes perchées dans les nues étaient le pavé d'un étage supérieur de galeries, de portiques, de terrasses . . . . . .

INDEX.

INDEX.

APPENDIX.

ERRATA.

—:o:—

Page 53, in head line, for "*Roman*" read "*Norman*."

,, 154 (Foot Note), for "**Μασσιφ**" read "**Μασσιν**."

,, 185, Line 19, for "Mylitis" read "Myelitis."

,, 220, Line 19, for "Chemical" read "Clinical."

,, 285, Line 31, for "prostrate" read "prostate"

,, 309, Line 1, for "the form of water" read "the forms of the bath."

,, 316, Line 23, for "are proper" read "all of which are proper."

,, 328, Line 18, for "contains" read "containing as it does," and in Line 20 omit "and."

,, 337, Line 24, for "*secundem*" read "*secundum*."

Illustration IX.—Plan of the Baths of Antoninus Caracalla, should face page 374, not 378.

BATH : J. B. KEENE & CO., "JOURNAL" AND "BLADUD" PRINTING WORKS.